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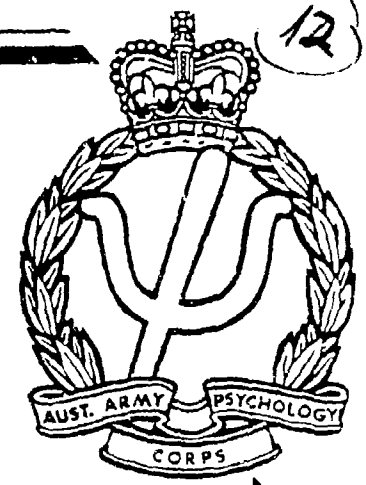

A PRELIMINARY INVESTIGATION INTO STRESS IN AUSTRALIAN ANTARCTIC EXPEDITIONERS

BY

LIEUTENANT COLONEL J.R. GODWIN

1st PSYCHOLOGICAL RESEARCH UNIT

Research Report 1/85

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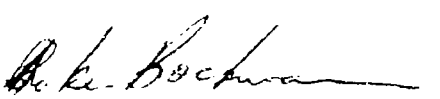

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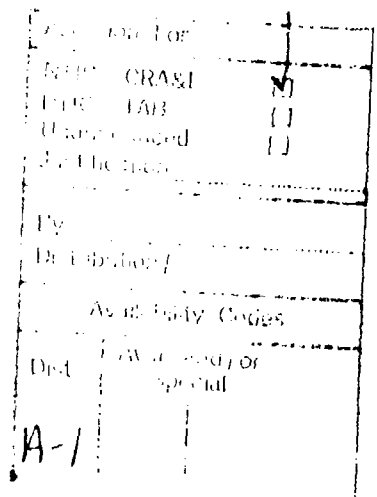
Abstract

Self-report measures, administered within a broad before and after design, were used to investigate the experience of stress for the three samples (Before Departure, After Arrival, and Previous Expenditioners) of Australian Antarctic expeditioners. Many common sources of pressure referred, as in previous studies, to aspects of the social environment. Neither Before Departure, nor After Arrival, did expeditioners anticipate the degree of pressure arising from this source. Additionally, task-related factors were more clearly identified as sources of pressure than in previous studies. Few differences were found on independent variables of age, marital status, occupational category, and previous ANARE experience, although notably, more married than single expenditioners reported 'Separation from my family and friends in Australia' as a source of pressure. There were high correlations between before and after samples on the rank order of 12 statements relating to specific aspects of station life. On the same statements all samples consistently, and significantly, rated Others as experiencing stress more frequently than Self, suggesting a coping strategy based on comparison with others. A mood questionnaire, administered before departure and after arrival, indicated low levels of stress and high levels of arousal, and differences in arousal but not stress, between administrations. The results suggest, inter alia, the need for further research on the relationship between performance and both stress and arousal in the Antarctic context.



Acknowledgements

The willing and helpful co-operation of expeditioners from the 1980-1983 Australian National Antarctic Research Expeditions made the completion of this study possible. I would like to sincerely thank all those expeditioners who participated.

The sponsorship of the study by the Director of the Antarctic Division, Department of Science and Technology, and the Department of Defence (Army Office), is acknowledged. Particular thanks go to Drs. Des Lugg and Peter Gormly from the Medical Section of the Antarctic Division for their encouragement and assistance through all stages of the project. Thanks go also to colleagues in 1 Psychological Research Unit for assistance and comment at various stages.

Finally, I am indebted to my supervisor Dr Keith Taylor for his valuable advice, and for what has been, for me, a particularly enjoyable and instructive association.

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Chapter 1

Introduction

> Antarctica is the continent of superlatives. Of all the seven continents, it is the most inaccessible and inhospitable - a desert of ice with the coldest, windiest, and driest climate in the world.
>
> Brewster (1982)

Historically, Australia's ties with Antarctica could be traced back to the outstanding voyages of Capt James Cook, who circumnavigated the then unknown continent between December 1772 and March 1775. Australians were involved in the exploration of the continent as members of the pioneering expeditions of Scott, and Shackleton, but the association was formalized when Australia mounted its own expeditions under the leadership of Sir Douglas Mawson in 1911.

Early interest in Antarctica was stimulated by geographic discovery, scientific investigation, and by the commercial sealing and whaling potential of the surrounding ocean. Subsequently, the continent has assumed added significance both as an area of natural resource potential, and of strategic importance to many countries. Australia maintains scientific expeditions in Antarctica, not only because of their intrinsic scientific worth, but also as a means of continuing its presence on the continent, and thereby supporting its territorial claims.

Australian National Antarctic Research Expeditions (ANARE)

The Australian government established the first Australian National Antarctic Research Expeditions (ANARE) in 1947-48, with stations at two sub-Antarctic islands, Heard Is., and Macquarie Is.. Annual expeditions have been maintained since that time. Currently, the Antarctic Division of the Department of Science and Technology operates three coastal stations in Antarctica - Casey, Davis, and Mawson - and one sub-antarctic station - Macquarie Is..

Station populations vary between 20-30 expeditioners, predominantly males. Scientists work to achieve the goals of the scientific programme developed by government departments and the Antarctic Research Policy Advisory Committee, but the greater proportion of staff at the stations are support staff (e.g. electricians, diesel mechanics, radio operators, cooks etc.). A station rebuilding programme for each of the continental stations commenced in 1978, and employs building tradesmen who have little identification with the station's scientific programme. Station populations increase during summer (late November through to early March) with the influx of scientists engaged in summer programmes, and additional

tradesmen required to enable the building programme to capitalize on the months of 24 hour daylight.

Applications to join ANARE are called for in February of each year. The final list of expeditioners is not established until August, following a selection procedure involving initial interview, psychological assessment, medical examination, and final grading. The selection procedure has the dual aim of identifying those individuals best qualified for the positions available, and of eliminating those assessed as least able to adapt to the conditions of isolation and confinement. From the point of view of a scientific study, it is necessary to note that the employment field is specialized, and that the population sample is selected. In this study, which seeks to investigate stress, the population sample consists of individuals who have survived a selection system designed to eliminate those considered unable to cope with the living and working conditions of an Antarctic station.

Expeditioners join ANARE in September, and after a 2-3 month training period in Australia (mostly in Hobart and Melbourne), travel by ship to Antarctica on voyages which depart, from Hobart, from November through to February. They spend from 12-15 months at a station (referred to as "wintering") before returning to Australia. Each expeditioner has a primary task, i.e. the position for which he is employed, and some will have received training for important secondary tasks such as fire officer, operating theatre assistant, projectionist. All have to participate in station "house keeping" duties.

The summer period, which is the new expeditioner's introduction to the station, is a period of disruption. Re-supply ships make several visits to each station, bringing both summer and winter expeditioners, logistic supplies, and mail, and the outgoing expeditioners hand over their jobs, pack, and depart. However, from March through to mid November, expeditioners are isolated. Extensive pack-ice prohibits the passage of ships to the coast, and currently, Australia does not have the facility to operate aircraft to its stations. Repatriation or evacuation cannot be considered in anything other than extreme emergencies, and even then may not be possible. The situation is summed up by Law (1960):

> The station is situated on a narrow speck of rock on the fringe of the vast and desolate continental ice sheet of Antarctica. Easy movement is restricted to an area of about one quarter of a square mile. A journey of any direction from the station outside this area necessitates the mounting of a field expedition. Most of the men, therefore, live for most of the year incarcerated in this little village which man's ingenuity has set up in this isolated spot;

> and they know that, whatever happens, no help can reach them. (p. 274)

This rather dramatic description helps to complete the background to this study. The writer's involvement and interest in ANARE has arisen from his employment in the Australian Army Psychology Corps, and that Corps' responsibility for the psychological assessment phase of the selection procedure for expeditioners. That involvement has included visits to the Casey, Davis, and Macquarie Is., stations during the 1980/81, and the 1982/83, summer season.

The General Aim of the Study

The writer's interest lay in undertaking a study that could take advantage of the experience of expeditioners themselves to obtain information of benefit to the selection process, and to future expeditioners in their preparation for employment in an ANARE.

There has been very little behavioural research undertaken at Australian Antarctic stations, and consequently there is no substantive research direction to follow. Recently, Champness (1981) proposed "a system of evaluation of individuals living under stress" based on an association with the 1979 Macquarie Is. expedition. This study accepts that the station environment may be stressful, but attempts to identify what elements of the environment are experienced as stressful.

The assumption that the environment is stressful is a reasonable one. Whilst the existence of fixed length expeditions, regular re-supply, better living conditions and improved communication facilities may lead to the comment that expeditioners "have it easy" in comparison with their predecessors, it is unlikely that that comment has much impact for current expeditioners. Their frame of reference is more likely to be the environment from which they have departed, and it is therefore argued that the conditions of isolation and confinement with which they are so suddenly confronted, have the potential to create an environment which some may find stressful, despite the enthusiasm and commitment with which they face the expedition.

However, there has been little systematic study of what it is within those broad areas of isolation and confinement that is experienced as stressful, and that is the thrust of this study.

The study is founded in the literature relating to psychological stress, but in a wider context, falls within the field of environmental psychology as described in Stokols (1977), and Darroch and Miller (1981). In fact, the latter suggest that "...for the really cool-headed

environmental psychologist the Australian Antarctic base provides a particularly intriguing person environment intersect to study." (p. 167).

Chapter 2

The Concept of Stress

The term "stress" has become a faddish catch-all used to explain numerous situations and behaviours. A common view of stress as an outcome of "today's society" or the "pressure of modern living" for example, contributes little to the understanding of stress, and similarly, efforts to use stress level as a lever for negotiation in wage determination (as reported in Hutton, 1981) run the risk of both a shallow evaluation and cynical appreciation of stress.

Stress is seen as both cause and effect, something in their environment to which individuals are exposed, and something from which they suffer. Consequently there is confusion associated with the meaning, and usage, of the term.

Nevertheless, whether or not the scientific niceties of definition are observed, individuals acknowledge "something" that they either experience or recognize as "stress". Stress has been thoroughly accepted as part of the popular vocabulary ahead of the development of a sound theoretical base, just as solutions for dealing with the negative outcomes of stress have developed ahead of the means to systematically identify and measure it.

Why Study Stress?

Coyne and Lazarus (1980) argue that two questions were of prime interest in early stress research, viz., "Under what conditions of stress does human performance deteriorate?"; and "Who are the people most vulnerable to such deterioration?" (p. 144). Those questions appear to have been asked from an academic and organizational perspective, whereas current arguments attesting to the pervasiveness of stress, e.g. throughout occupations (Fletcher, Gowler, and Payne, 1979; Halfpenny, 1981), and to the association of stress with physical and psychological well-being, have guaranteed a level of interest by individuals on their own behalf.

Stress is therefore important from both the organizational and the individual perspective. The literature accepts the negative physical and psychological effects of stress (Christensen, 1980; Cooper, 1978; Selye, 1976; Warr and Wall, 1975), effects which are obviously important from both perspectives, but there seems to be less certainty regarding the effect of stress on performance, particularly in the short term, and in an applied or field setting.

In this study the interest is directed toward selection, training, and management within an organization. It is argued that if there are elements of the environment that commonly lead to the experience of stress, then the

selection process should take account of those in looking at the prediction of individual adjustment (Nardini, Herrman, and Rasmussen, 1962); further, that as a result of research, the training programme may be able to increase the awareness of expeditioners (Shurley, 1973); and finally, that the management and supervision of expeditioners should benefit from greater awareness of possible behaviour patterns within the station environment.

The Concept of Stress

The use of stress as a psychological concept has developed from the work of the endocrinologist Hans Selye (Appley and Trumbull, 1967; Cox, 1978), and in the psychological literature, from a combining of studies on fear, anxiety, threat and conflict (Lazarus, 1966). Selye (1980) traces his first contact with what he later identified as a General Adaptation Syndrome, to a period "about forty years ago", while over 30 years ago, Lazarus, Deese, and Osler (1952) referred to the lack of definition in, and increasing size of, the field of stress research.

The popular usage of stress, as an almost self-explanatory term, may be an indication of the utility of the concept. It is not a foundation upon which to base research, although in the field of applied psychology there is benefit in having an identifiable bridge linking common usage to the researcher's definition of the concept being studied.

This link exists in the transactional models of stress[1] (Cox, 1978; Coyne and Lazarus, 1980) through the use of the word "coping", although these models may place a greater emphasis on the role of the individual in the coping process, and in experiencing stress, than individuals themselves may want to acknowledge.

To pursue this argument the writer has followed the approach used by both Appley and Trumbull (1967), and Cox (1978), in their reviews of the development of the stress concept. Cox, in a concise and informative review, identifies three approaches to the study of psychological stress, these are:

(a) response-based definitions and models;
(b) stimulus-based definitions and models; and
(c) interactional definitions and models.

Both the response-based and the stimulus-based approaches in their simplest expression cover what could be

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[1] These models are sometimes referred to as cognitive models, sometimes as interactional models, and sometimes as transactional models. The question of "transaction" and "interaction" will be raised later in this chapter.

called the lay appreciation of stress. Cox discusses these approaches in the order shown, i.e. response first, stimulus second, but the origin of the stress concept in psychology suggests that they be considered in the conventional order.

Stimulus-based Approach

The use of stress in engineering, as an external pressure on an object leading to strain, was adapted as an analogy for the psychological concept of stress. Thus a stimulus, stress, existing in the environment, is exerted upon an individual, resulting in the response, strain. Removal of the stimulus allows the individual to return to normal (using the analogy of Hooke's Law of Elasticity) unless the stress has been severe enough to cause permanent change.

In attempting to identify stress in an environment there is a danger of pre-determining not only what will cause strain, but also that certain environments will be common sources of strain for all individuals. Thus the common criticisms of the stimulus-based approach are that it overlooks individual differences, e.g. Lazarus (1966) states that "...stress cannot be defined exclusively by situations because the capacity of any situation to produce stress reactions depends on characteristics of the individual" (p. 5), and that it leads to the researcher, or observer, deciding what is stressful in an environment.

Response-based Approach

This approach defines stress in terms of the reaction or response of the individual to "stressors" in the environment. The major contributor to this approach has been Selye, whose General Adaptation Syndrome model is based on a physiological concept of systemic stress, and incorporates three stages, Alarm Reaction, Resistance, and Exhaustion, in explaining an individual's response to environmental stressors.

Selye (1980) defines stress as the "...non specific response of the body to any demand" (p. 127). He contends that no matter what the environmental stressor may be, the adaptation process within the individual is always the same, with the intensity of the demand for adjustment leading to a variation in the degree of response and not the nature of the response.

Selye has been primarily concerned with the physiological response to stressors, and according to Cox (1978, p.7) this has led to psychological processes being ignored. However, Selye's approach has initiated that field of stress research which concentrates upon the physiological costs of stress, including attempts to correlate physiological and behavioural measures of stress. This multi-disciplinary approach is seen as necessary in the long term, although the effective combination of

physiological and psychological measures in a field study is difficult to achieve.

Selye's approach is complemented by his development of a "code of ethics" (1980, p.141) in which he incorporates findings from his research on stress, and it is in this almost philosophical approach that he introduces psychological considerations as means for coping with environmental stressors, e.g. "Only through planned self-analysis can we establish what we really want; too many people suffer all their lives because they are too conservative to risk a radical change and break with traditions." (1980, p.142).

It is evident that Selye considers attempts by individuals to modify environmental stressors as a means of reducing the demands placed upon them. This not only illustrates the fine line that separates stimulus- and response-based models, but also emphasizes that stress should be approached from a standpoint of the interaction of the individual and the environment. The same conclusion can be drawn from criticisms of the stimulus-based approach.

This brief review of the stimulus and response-based approaches, and the position which the writer will take in favour of interactional approaches is unfortunately not a reflection of consensus within the field of psychology.

For example, Warr and Wall (1975) in reviewing work stress, opt quite confidently for a response-based definition because it is "...more clearly identified with common usage" (p.142), and quite incorrectly associate authors who have initiated an individual-environment interaction approach with the simpler stimulus-based approach.

Interactional Approach

The approaches to stress covered by the term "interactional" emphasize the intervention of cognitive processes in the individual's interaction with his environment, and the models that have been developed attempt to account for these processes.

This is not to say that cognitive processes are denied by either the stimulus- or response-based models, but that in the interactional models, stress is more directly linked to cognitive processes, rather than the properties of the environment or the individual's response to the environment.

The approach does not ignore physiological processes but prefers to see them as an outcome of the cognitive processes, and therefore as indicators of stress. Lazarus (1966) saw stress as a collective term covering an area of study which embraced sociological, psychological and physiological processes, but his approach, as explained and

adapted by McGrath is concerned with "..interpreting events in the 'stress cycle' from a social-psychological perspective." (McGrath, 1976, p. 1352).

An effort to pin-point the origins of the interactional approach has not been made. Kahn, Wolfe, Quinn, and Snoek (1964) used the idea of person-environment fit in investigating the relationship between the individual's role and organizational stress, but Lazarus (1966) provides a more general psychological base and is used by the writer as an introduction to this approach.

There may be some confusion over the use of the terms "interaction" and "transaction". Lazarus uses the word "transaction" to describe an approach similar to those covered by Cox in the latter's description of interactional approaches. Lazarus (1966) considered that stress had to be defined "...in terms of transactions between individuals and situations." (p.5, writer's emphasis). Coyne and Lazarus (1980) clarify the use of transaction in this context by referring to Dewey and Bentley's[2] (1949) proposal of self-action, interaction, and transaction, as "...three levels of organization of enquiry through which the development of knowledge and the history of science progress." (p. 145).

As reported by Coyne and Lazarus, transaction is described by Dewey and Bentley as follows: "...where systems of description and naming are employed to deal with aspects and phases of action, without final attribution to 'elements' or other presumptively detachable or independent 'entities'." (p.145).

Using this nomenclature, the stimulus- and response-based models can be categorized as interaction models - "interaction, where thing is balanced against thing in causal interaction." (p.145) - leaving Cox's categorization somewhat up in the air. Cox is rescued by his definition of his model of stress as a transactional model, and in fact he uses interaction as a synonym for transaction. From this point the writer will use the word transaction when referring to the cognitive models of stress.

Transactional Models of Stress

In arguing that stress has to be defined in terms of the transactions between individuals and situations, rather than either the stimulii with which they are presented or the responses that they make, Lazarus introduces the intervening variable of threat, and the cognitive process of appraisal.

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[2]Cited in Coyne and Lazarus (1980, p.145) and not consulted by the writer.

Through primary appraisal of a situation, the individual may anticipate that that situation is threatening, or challenging, and as a consequence attempt to take action to reduce the threat or to meet the challenge. Secondary appraisal occurs following the initial action. This process of cognitive appraisal, which is dependent upon factors in the stimulus configuration within the individual, and upon the consequent action taken by the individual, is described as the coping process.

Thus there is the introduction of the term "coping" in a sense which is similar to its everyday use, but which implies a more structured process than everyday usage would recognize, and a greater opportunity for action on the part of the individual. Although it is the success or otherwise of the individual's coping action that determines whether stress will be experienced, it must be recognized that changes in either the external demand placed upon the individual, or in the ability of the individual, could affect the coping process.

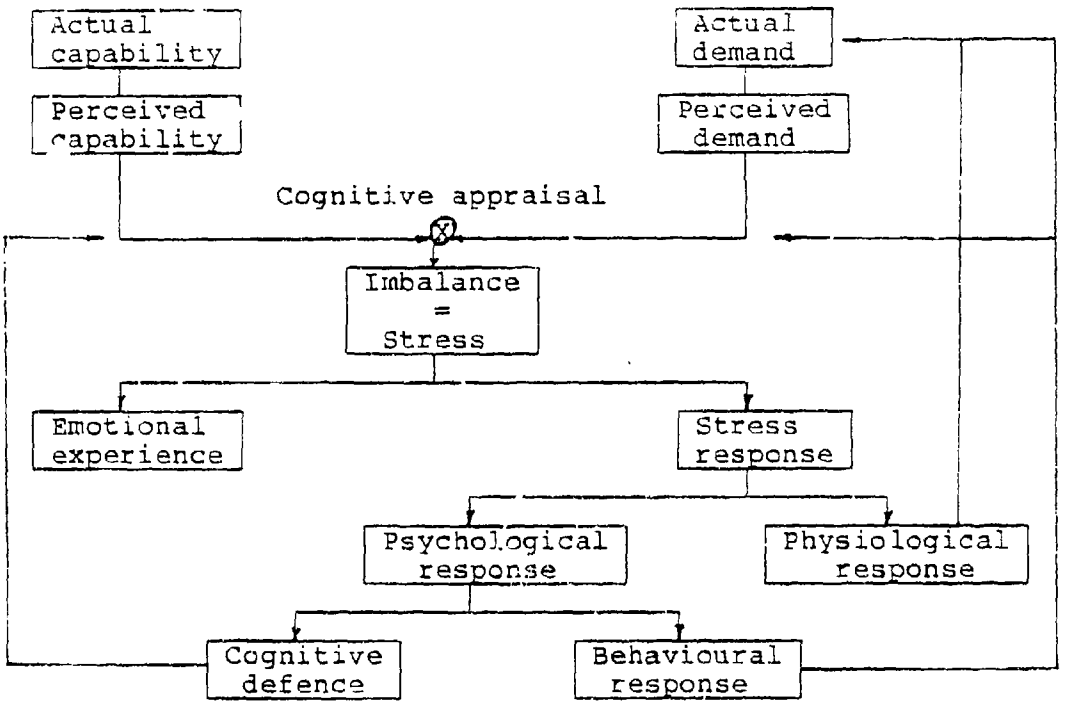
It is in the constant and continuing appraisal process that the meaning of transaction becomes clear. Lazarus proposes a continuing feedback system between individual and environment, as action resulting from the coping process is continually appraised against the perceived threat or challenge.

Cox and Mackay (Cox, 1978) have proposed a transactional model which lies, in terms of development, between the initial formulation of the Lazarus (1966) model and its most recent expressions in Coyne and Lazarus (1980), and Lazarus (1981). For that reason, and the fact that Cox and Mackay provide a useful diagrammatic representation, the Cox and Mackay model will be used to illustrate how the transactional models present stress as an outcome of the coping process.

Cox and Mackay's model is reproduced in Figure 1. The important feature of the model is the proposition that stress arises as a result of an imbalance following the individual's appraisal of the demand that he perceives as being placed upon him, and his perceived capability to meet that demand. Feedback loops allow the continual reappraisal of perceived capability versus perceived demand as the system attempts to achieve balance, and thereby emphasize the transactional nature of the system.

Figure 1

Transactional Model of Stress (Cox and Mackay)[3]



Cox draws attention to the eclectic nature of the model, but emphasizes the importance of the cognitive appraisal process. In so doing he supports the similar position taken by Lazarus. From the model presented in Figure 1, Cox draws the following definition of stress:

> ...a perceptual phenomenon arising from a comparison between the demand on the person and his ability to cope. An imbalance in this mechanism, when coping is important, gives rise to the experience of stress, and to stress response. The latter represent attempts at coping with the source of stress. Coping is both psychological (involving cognitive and behavioural strategies) and physiological. If normal coping is ineffective, stress is prolonged and abnormal responses may occur. The occurrence of these, and prolonged exposure to stress per se, may give rise to functional and structural damage. The progress of these events is subject to great individual variation. (p. 25)

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[3]Reproduced from Cox, T. Stress. London: MacMillan, 1978.

In considering the model, it is argued that the separation of emotional experience from the psychological and physiological response is not satisfactorily explained. Cox states that "The experience of stress is indeed an emotional one" (1978, p.37) but whether the model proposes that cognitive appraisal allows individuals to associate their emotion with specific demands in their environment, is not clear. Whilst this may be a weakness in a cognitive model, it does provide direction in a stress study. It can be argued that this study, relying as it does on self-report, should consider both specific situations, and emotion, in attempting to identify and measure stress.

From Cox's consideration of emotion and the experience of stress (1978, chap 2), it appears that the separation of emotional experience is based upon theories of emotion which ascribe to emotion "...the role of epiphenomenon, a secondary feature possessing no faculty for controlling other events." (p. 37). Cox acknowledges that this view of emotion conflicts with common sense, and he obviously considers that emotion should be studied within a stress context. Further, when he discusses the concept of coping as the "...key concept in understanding man's psychological response to stress..." (p. 73) the presence of emotion both as a stimulus to behaviour, and as an indication of stress, can be inferred. The writer would argue that emotions such as fear or hostility for example, are likely to affect coping ability, but may not be cognitively associated with a demand situation by the individual.

From the preceding paragraph it can be argued that the Cox and Mackay model should reflect a tentative link between emotional experience and at least psychological response, and as a consequence, the following stages of the system.

The relationship of physiological response to psychological response and its outcomes, and the ability of the individual to appraise physiological response, could also be queried, and this is in part acknowledged by Cox (p.24).

The preceding comments serve to illustrate the extent of the psychological field that can be covered in studying stress. The value of the Cox and Mackay model lies in its illustration of stress as an outcome of a transactional relationship between the individual and his environment, specifically, an imbalance in that relationship.

Application of the Transactional Approach

The complexity of the Cox and Mackay model raises immediate difficulties when it is considered for application to the applied field. The very nature of transaction means that the individual's behaviour may be modifying both the environment and the individual in a step by step manner which will be difficult for both observer and individual to identify. Coyne and Lazarus (1980) indicate the impact on research methodology in describing a project in which they are involved:

> Currently we are engaged in a research project in which the adaptation of normal adults in various environmental contexts is repeatedly assessed throughout a one year period. Using a variety of instruments and in-depth interviews, we examine fluctuations in person-environment relationships by measuring major life changes, daily hassles, uplifts, coping processes, patterns of emotion, and adaptational outcomes such as health, morale, and social functioning. (p. 149)

Given that approach it is not surprising that Coyne and Lazarus have moved Lazarus' original transactional model forward into a cognitive - phenomenological model in what they describe as a "metatheoretical shift". Whilst being able to follow the evolution of the transactional model, the researcher in the applied field is left with a need for something rather more concrete and managable upon which to base a preliminary field study, but which at the same time can incorporate the concept of stress proposed by the transactional models. It is considered that that base is provided by McGrath (1976).

McGrath has developed a rather grandly titled "paradigm for the study of stress" based on a working definition of stress very similar to that presented by Cox, viz:

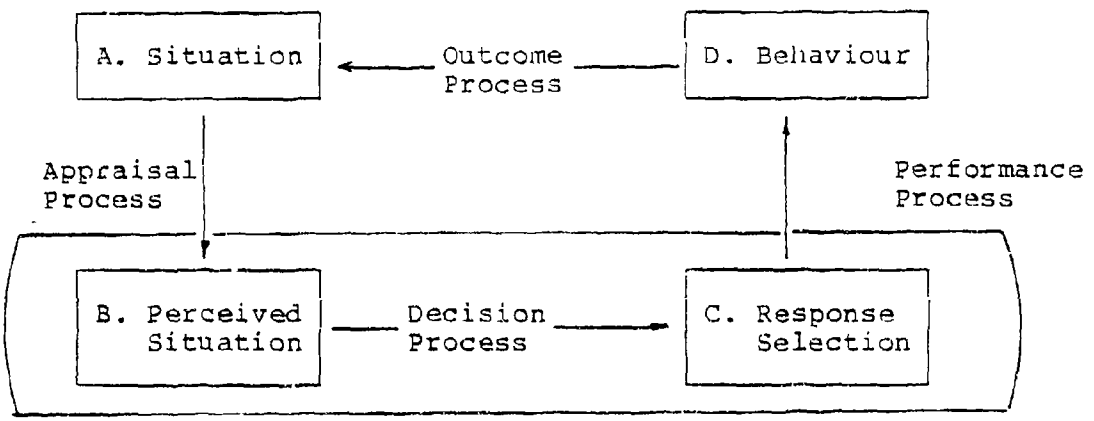
> ...there is a potential for stress when an environmental situation is perceived as presenting a demand which threatens to exceed the person's capabilities and resources for meeting it, under conditions where he expects a substantial differential in the rewards and costs from meeting the demand versus not meeting it. (p. 1352).

In common with the transactional models there is an emphasis on the essential cognitive appraisal element in the individual's relationship with his environment, and this is evident in McGrath's so-called paradigm, which is presented in Figure 2.

There is an obvious similarity between this paradigm and the model presented by Cox. McGrath, in describing his paradigm, also refers to the similarities with the Lazarus (1966) approach.

Figure 2

A Paradigm for the Study of Stress[4]



McGrath describes the four stages in the cycle as being connected by the "linking processes" of appraisal, decision, performance, and outcome. He sees the experience of stress, as a subjective state, and as being a function of the appraisal process. Reference to Figure 1, will show that Cox and Mackay place the cognitive appraisal step after the perceived demand and perceived ability steps thereby overlapping with McGrath's "decision process". McGrath acknowledges a similar overlap between the Lazarus (1966) term "secondary appraisal" and his decision process, and the point seems to be one of detail rather than substance.

The agreement of the transactional models regarding the primacy of the appraisal process provides a starting point for this study, and the wording of questionnaire items relating to living and working in Antarctica can be framed in terms of the individual's appraisal of the environment or its effect. It is doubtful whether the individual can be expected to separate the linking processes, or the primary and secondary appraisal processes, and therefore self-report measures may only access the individual's global appraisal which may include short or long term costs or rewards. At minimum therefore, some attempt should be made to account for time, as indicated by Coyne and Lazarus (ee p. 13), and Beehr and Newman (1978), in order to investigate possible changes in the appraisal process.

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[4]Reproduced from McGrath, J.E. Stress and Behaviour in Organizations. In M.D Dunnette (Ed.), Handbook of Industrial and Organizational Psychology. Chicago: Rand McNally, 1976.

Given the existence of the transactional models, it is still necessary to determine how best to relate the individual to his environment in a systematic way. A further conceptual framework proposed by McGrath is most helpful in addressing this question, because of the unique nature of the Antarctic station environment.

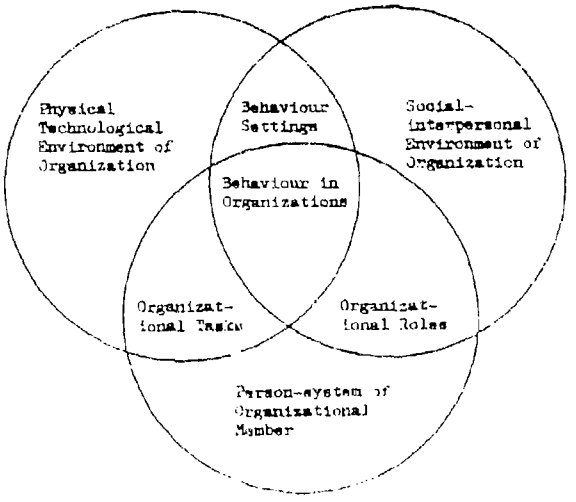
The Antarctic station can be seen to be an organization, in the sense in which Industrial/ Organizational psychologists use the term. Not only is it an organization, but for practical purposes, it is the only organization in which the member's behaviour takes place. Apart from radiophone or telex communication with Australia or with other stations, and a daily telex news summary, there is no contact outside the station and there are no other external organizations to which the expeditioner can belong. External forces may impact upon expeditioners, but in comparison with most organizational situations, the Antarctic station is self-contained, and because of its location, it restricts the interaction of its members with any external forces.

McGrath proposes that behaviour in organizations can be considered as "...the interaction of three conceptually independent 'systems' ", viz:

(a) The physical and technological environment in which the behaviour takes place;
(b) The social medium, or patterns of interpersonal relations, within which the behaviour occurs; and,
(c) The "person system" or "self system" of the focal person whose behaviour is to be considered. (p. 1367).

The relationship of the three systems is shown in Figure 3, together with the labels used by McGrath.

Figure 3
Three Embedding Systems for Behaviour in Organizations



McGrath argues that the framework indicates six "classes" of stress, or situations which may be perceived by the individual to be stressful, viz:

1. Task-based stress (difficulty, ambiguity, load, etc.).
2. Role-based stress (conflict, ambiguity, load etc.).
3. Stress intrinsic to the behaviour setting (e.g. effects of crowding, of undermanning, etc.).
4. Stress arising from the physical environment itself (e.g. extreme cold, hostile forces, etc.).
5. Stress arising from the social environment, in the sense of interpersonal relations (e.g. interpersonal disagreement, privacy, and isolation, etc.).
6. Stress within the person system, which the focal person 'brings with him' to the situation (e.g. anxiety, perceptual styles, etc.). (p 1369)

Difficulty in maintaining such a separation in real life is anticipated, but the conceptual famework provided by Figure 3, and the "classes" of stress proposed by McGrath, have been used as the basis for this study.

The framework does provide some structure for the assumption that the Antarctic station environment is stressful. The individual, in the appraisal process, is faced with an environment with which he is unfamiliar. With perhaps the exception of his task ability, he is faced with a physical and social environment which demands, not necessarily new coping skills, but an effective adaptation of existing skills to an environment in which those skills have not previously been applied. Bearing in mind McGrath's working definition of stress (quoted on p. 13), there can be seen to be a substantial differential in the rewards and costs from meeting the demands versus not meeting the demands of the environment e.g. being caught ill-prepared in a blizzard (physical environment) is life threatening; being rejected socially (social environment) by some or all of the group may threaten psychological well-being. Similar points were also made by Radloff and Helmreich (1968, ch. 5) in their discussion of costs and rewards in "exotic environments".

In a lengthy consideration of Tasks and Stress, Behaviour Settings and Stress, and Roles and Stress, McGrath reviewed research relevant to his framework and effectively opened up many areas for research in the organizational setting. The difficulty in maintaining the separation between his six "classes" of stress in real life situations is accepted, nevertheless, because of the unique nature of the Antarctic station organization, his conceptual framework has been used as a means of generating items for a questionnaire approach to investigating stress in the Antarctic station environment.

Similarities to McGrath's approach can be found in a series of papers and research by Cooper and Marshall (1976, 1979) and Cooper (1978). These writers approached the question of occupational stress by acknowledging the need to look at the interaction between work (e.g. task, role, career development, relationships, organizational structure), the individual, and extra-organizational factors (e.g. family, life crises). The level of structure inherent in the McGrath model is missing but the same issues are raised.

Beehr and Newman (1978) propose a facet design, "to delimit and make explicit" the phenomenon of job stress. They propose seven facets (Environmental, Personal, Process, Human Consequences, Organizational Consequences, Adaptive Responses, and Time) and include factors that they consider should be studied. Again there is a similarity to the McGrath model, specifically in the elements included in the Environmental, and Personal, facets. The addition of the Time facet has been referred to previously and is considered to be important.

Conclusion

This Chapter has concentrated upon transactional models of stress because they appear to represent the direction in which the study of stress is evolving within the psychological literature. This has been at the cost of ignoring the other major area within the literature initiated by Selye's General Adaptation Syndrome and which attempts to relate physiological and psychological processes within the individual. The transactional models generally acknowledge physiological responses as an indicator of the experience of stress, but have concentrated upon cognitive processes.

The appeal of the transactional models centres upon their reliance on cognitive processes (generally summarized as coping) and in the foundation that the concept of "coping" provides for building a link between the common usage of stress and its use within the field of psychology.

The working definitions of stress provided by Cox (p. 11) and McGrath (p. 13), lead to the conclusion that stress should not be seen as a unitary concept. Rather it is a collective term that may cover the many emotional, psychological, or physiological outcomes of individuals' transactions with their environment, where those outcomes arise from either the imbalance, referred to by Cox, or the capabilities and resources vs. costs and rewards balance referred to by McGrath. The writer acknowledges that this tends to reduce the distinction between studies of stress, and other fields of psychology, e.g., studies of anxiety, but the use of the term may yet fulfill a useful co-ordinating function, particularly in the applied setting.

McGrath's development of a conceptual framework (Figure 3) for considering stress in organizations has been adopted because of its potential as a comprehensive base for research, and because of its application to the Antarctic station environment, particularly for a preliminary study.

Chapter 3

Stress and Stress-related Studies at Antarctic Stations

An intriguing review of early observations of behaviour in the Antarctic is provided by Lugg (1975a, 1977), but formal behavioural studies at Antarctic stations did not commence until immediately following the International Geophysical Year (IGY) in 1957 when national bases were established by several countries. The impetus provided by the IGY was maintained through to the early 1970's, but from that point the literature has reflected an apparent reduction in the number of behavioural studies conducted at Antarctic stations.

With the exception of studies by Lugg (1977), Owens (1975)[5], and Palmai (1963), the Antarctic Division has had to refer to psychological studies conducted by other countries, predominantly the United States of America, and experience (e.g. Law, 1960), in understanding and managing Australian stations. The Australian studies referred to ANARE populations of the early 1960's, and since that period there have been considerable changes in station size and composition.

Whilst some US and New Zealand studies are of more recent origin, it should be noted that factors such as station size, composition (e.g. US stations comprise a mixture of US Navy and civilian personnel), and ambient conditions may vary markedly from Australian stations. Cultural differences could also be considered in this context, and indeed, these have been observed (Lewis, 1977, p.135).

Based on the assumption that the station environment was stressful, research conducted at US stations immediately following the IGY concentrated upon the identification of factors which would predict successful adjustment to the stressful environment. This research is thoroughly reviewed by Gunderson (1974) and Owens (1975), and is succinctly summarized by Taylor (1978a) in his presentation of "...ability, stability, and relative compatibility" (p.32) as the three main attributes contributing to successful adjustment at Antarctic stations.

Consequently the need to design selection procedures to assess those factors has been emphasized. However, it can be argued that the factors are important to many employments, and that it would be helpful to be aware of what it is in the environment that threatens adjustment, or in the terms of the transactional approaches to stress, what imbalances relative to ability, stability, and relative

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[5] A composite report of several earlier studies conducted by Owens.

compatibility are likely to lead to the experience of stress.

The relationship of these three factors with adjustment provides an insight into the effects of stress in the station environment and supports the earlier emphasis of the need for organizational and individual interest in the area. If, for example, an individual is unable to meet the demands of his primary task, then that is likely to affect his overall adjustment. Poor task performance, and poor adjustment, in a small interdependent group is likely to have repercussions for the organization (in goal achievement for example) and for the individual, and may well lead to the experience of stress.

What are the Indicators of Stress?

The literature reflects an accepted position that the experience of stress may have a negative effect on performance (Wilkinson, 1969; Watson, 1980, ch.8) and on health (Cooper, 1978; Cox, 1978; Warr and Wall, 1975), which in turn affects performance.

There is an inherent difficulty in measuring the effect of stress on performance in the applied setting because of the lack of effective measures of performance in those settings. This is particularly so in a setting such as the Antarctic Station, comprising as it does a mix of specialized occupational skills, where perhaps only the cook's performance is critically assessed on a regular basis.

The inverted-U relationship that has been used traditionally to represent the relationship between stress and performance has been challenged by both Cox (1978) and McGrath (1976). Cox distinguished between stress and arousal, and proposed performance as having an inverted U-shaped relationship with arousal, but a monotonic relationship with stress. It is a useful distinction, but it adds a new dimension to the practical problem of being able to recognize at what point stress (and now arousal) becomes dysfunctional in a work situation.

The impact of stress upon health introduces a cost to organizations in terms of reduced manpower efficiency and availability but this impact is more easily demonstrated for long term illness, rather than for the short term effects of headache, tension, or anxiety, which are commonly considered as examples of stress-related "illnesses". An attraction in studying stress-related illness lies in the fact that health records are generally kept and may allow the frequencies of such illness to be quantified. However the allocation of illness to cause is seldom straight forward despite the readiness with which stress and illness are linked.

It is reasonable to conclude that the assumption that there is an effect of stress upon performance is strong enough to support an organization's interest in its own work environment, with a view to managing both environment and individuals in a manner designed to reduce the probability of the experience of stress leading to negative outcomes. Effective management in this sense is necessary even where the status quo does not provide immediate evidence of dysfunction.

The effect of stress on performance in a small isolated group may be exacerbated because of the closed community and close living and working conditions. A cohesive, supportive group is seen to be important to the achievement of expedition goals, and the maintenance of the psychological well-being of individual members.

The two indicators, namely, performance and health, will be used in the initial part of this literature review to consider, first, whether evidence exists to support the contention that the environment is stressful, and second, whether there is evidence that stress adversely affects performance.

Stress[6] and Performance at Antarctic Stations

Owens (1975) reported data on a Behaviour Under Stress scale which is one of several scales comprising the end of year report completed on each Australian expeditioner by the station Officer-in-Charge (OIC).

Owens stated that the scale was introduced because of the consistent assumption that performance is affected by stress, and added that the scale was "...designed to measure stress tolerance as a capacity to perform under pressure." (p.74). However, the points on the scale - Imperturbable, Calm, Restrained, Excitable, Panicky - presumed that OICs made the assumed connection between the scale descriptors and performance, and also that they were able to recognize when individuals were experiencing stress. Both assumptions could be challenged and unfortunately there were no supporting scale items which indicated frequency or intensity of stress.

Owens found only a "modest relationship" (r=.35) between the scale and the overall rating, Would You Have Him Again?, but a "substantial relationship" (r=.52) with the scale, Value as a Member of Field Trip. The latter relationship was supported in a factor analysis of the OICs' ratings in which Behaviour Under Stress, Desire to Participate in a Field Trip, and Value as a Member of a

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[6] In reviewing the literature, the writer has used the term "stress" as it has been used by the author(s) of the studies cited

Field Trip, loaded with the overall rating on a factor labelled, Field Factor.

Assuming that the scale measured what it was designed to measure, it can be concluded that OICs perceived (or predicted?) a link between stress and performance for field trips, where task performance and stability are perhaps more important than within the relative safety of the station. Indications of stress may also be more easily observed in a field trip situation.

A comparison of the percentage distribution of ratings on the Behaviour Under Stress scale between Owens' 1960-61 expeditioner population, and the 1980-82 expeditioner population from which the major sample in this study is drawn, is shown in Table 1. The Chi-square based on the raw frequency distribution shows a significant difference toward the favourable end of the Scale for 1980-82 expeditioners, but it is doubtful whether this can be interpreted either as indicative of a reduction in the experience of stress, or that expeditioners are performing better under stress.

It is noted that at one station the OIC wrote "not known" on this scale, for 40 percent of his expeditioners, which suggests that he was not able to observe them in a situation which he considered to be stressful.

Table 1

Percentage Distribution of Ratings on OIC Rating Scale: Behaviour Under Stress

Population	Imperturbable	Calm	Restrained	Excitable	Panicky
1960-61(N=135)	8	31	31	23	7
1980-82(N=251)	13	42	21	19	2

$X^2 = 10.78$ $.05 > p > .01$

From these data on Australian stations there is no real evidence that allows a conclusion that stress in the station environment is dysfunctional, but this was not unexpected. From Table 1 it would seem that OICs are able to rate behaviour under stress and that 30 percent of the 1960-61 population, and 21 percent of the 1980-82 population could be argued to have performed poorly under stress. The effects on either individual or group adjustment, and performance, are not known.

Gregson (1978) addressed the question of the effect of a stressful environment on cognitive performance. Taking as given the assumption that the environment was stressful, Gregson administered two cognitive performance tests (Letter-String Recall, and Elapsed Time Estimation) to a small group (N=9) of NZ expeditioners at

the beginning and end of their winter expedition. There was a slight improvement in performance on the first test, whilst performance on the second test remained stable.

Gregson stated that his results were indicative of low stress, and that they did not substantiate the expectation of high stress in Antarctic working conditions. The writer would argue that the completion of these laboratory-type tests, even within the natural environment, may have had little relationship with stress experienced within that environment. Indeed, the second administration may have provided a novel situation which for some, was more stimulating than their usual routine. Gregson concluded that research on performance change should be repeated at short intervals, and should also include measures of physiological response to stress.

The paucity of studies which directly investigate the effect of stress on performance should not be unexpected in a field setting such as an Antarctic station. Despite the station being seen as a natural laboratory (Law, 1960; Shurley, 1973), difficulties associated with access, the problem solving orientation usually associated with research in applied settings, and perhaps a reluctance to submit working groups such as expeditioners to behavioural research, have probably combined to limit the extent of such research, once selection procedures had been formulated, implemented, and validated.

Although it is reasonable to assume that the implementation of selection procedures is seen as a means of insuring against poor performance, it would be short-sighted to expect to be able to rely solely on those procedures.

Stress and Health at Antarctic Stations

Epidemiologies for Australian, Russian, and British expeditions are provided in Lugg (1973, 1977) and Lloyd (1973). Whilst psychiatric illness, and functional disorders not related to trauma or accident, are reported, there is no direct reference to stress. Symptoms or illness that could conceivably be stress-related have been extracted by the writer and are shown in Table 2.

Table 2

Epidemiologies : Possible Stress-related Disorders as a Percentage of Total Medical Referrals

Category[a]	Australian Expeditions 1947-72	Russian Expeditions 1961-70	British Expeditions 1959-66
Mental, psychoneurotic, personality disorders.	1.8	9.9	3.4[b] 6.1[c]
Symptoms and ill-defined disease e.g., dyspepsia, insomnia, backache.	18.9	N/A	17.7

[a] British figures were extracted from Lloyd (1973) to meet the Australian categorization used by Lugg (1973).

[b] Major cases

[c] Minor cases

Lloyd (1973) considered the referral rate at British stations to be "fairly high" (p.78). Doury and Pattin (1973) in referring to French expeditions, stated that illness, "...as expressed by consultation..." was common, and "... due to functional disorders attributable to isolation and the closed community life", but provided no statistical information. Mullin (1960) referred to the "...rather extraordinary frequency of headaches" amongst US expeditioners, and Palmai (1963) reported that "...half the visits (to the Medical Officer) consisted in demands for counselling..." and that "...of new cases, headache and psychogenic referrals accounted for 37 percent of the total" (p.368). There is therefore some support for an argument that some presenting symptoms may be psychosomatic or stress-related, and related to living in the station environment.

Lugg (1977), from the vantage point of Medical Officer, unobtrusively studied his nine companions at Davis Station in 1963 by keeping daily reports. In discussing adaptation to stress he stated that the "... conditions of isolation, deprivation, and hazards, and the absence of the usual sources of stimulation, diversion, and emotional support were not generally regarded as stressful by the men wintering there." (p.116).

Lugg (1975b), and Lugg and Gormly (1980), in discussing Antarctic medicine, did not make reference to statistical evidence of stress-related symptoms or disease. However, Lugg referred to the "abundance of anecdote reports" regarding the effect of environmental stresses

physical and mental health, and observed that the reports "have not all given false impressions".

Medical evidence is equivocal at best, and there appears to have been little attempt to place any interpretation upon the epidemiological records that are available. Those comments that have been quoted do suggest that the symptoms reported, and the action of self referral to the Medical Officer, reflected an experience of stress related to the station environment, but this is not supported unanimously.

To the writer's knowledge there have not been any medical or psychological studies of a long term nature that have sought to follow-up expeditioners after their return from Antarctica. In view of the life-events approach that has been taken in stress-research (Christensen, 1981; Gunderson and Rahe, 1974: Minter and Kimball, 1980), and the need to consider the process of time in stress research, post event follow-ups could be worthwhile.

There are several reported studies that have concentrated upon what could be called a symptom approach in investigating stress in the Antarctic environment.

Gunderson (1963) sampled US expeditioners (N=341) using a List of Common Symptoms designed to elicit the presence and severity of a number of common somatic and emotional complaints.

According to Gunderson, the results indicated that the incidence of sleeplessness, depression and irritability were much higher than would be expected in normal settings, and that the overall incidence of emotional disturbances and somatic complaints tended "...to increase in healthy subjects exposed to prolonged restricted stimulation such as that encountered in the Antarctic situation"(p.366). Gunderson drew attention to similar results from laboratory studies.

He also emphasized the presence of wide individual differences in his results, but suggested that an increase in emotional disturbances even for a small number, could affect cohesion in a small group. The study did not consider, inter alia, what features of the Antarctic station environmen may have induced emotional change.

Using the same questionnaire over a four year period (1964-1968), Doll and Gunderson (1971) investigated the influence of group size, and occupational status on scales of Depression, Insomnia, Anxiety and Hostility. Relatively few differences were found, and those that were may not be relevant to Australian stations. The authors found higher feelings of hostility amongst the servicemen at small stations (population 8-10), and with regard to occupational status, servicemen were higher on symptoms of Depression and Insomnia. No differences at all were found on the Anxiety scale.

Strange and Klein (1973) reported findings of a psychiatric debriefing project conducted with US wintering personnel at Byrd and South Pole stations for the 1969-1971 expeditions. The only description of the interviews referred to them as "...detailed psychiatric interviews conducted on station"(p.410). The number interviewed was not stated, but from knowledge of station populations it is likely to have been around 100.

Feelings of depression, problems of hostility, and sleep disturbance were reported by 60 percent or more of expeditioners, while impaired cognition was reported by 41 percent. The frequency with which these feelings occurred is not stated but they are reported as having occurred during the winter period of isolation, from April to October. Feelings of anxiety were reported by 28 percent of expeditioners and "...were almost always related specifically to events occurring at home,"(p.414).

Strange and Klein considered that the symptoms that they reported were part of the adaptation process but emphasized that the interviews were conducted to meet clinical and operational, rather than research, needs. Whilst the symptoms are rarely reported as being disabling for individuals, the effect on group interaction is not clear.

Four basic types of emotional illness, depression, alcohol abuse, paranoid reaction, and psychosomatic disorder occurred during the years covered by the study, but again the frequency was not reported. The authors did note a "...greater Command attention and consistency in control of alcohol"(p.413), but this may reflect quite a different situation to Australian stations where there is no longer a ban on spirits, and where production, as well as consumption, of the station home brew is a social activity.

Taylor (1973, 1978b) used an Isolation Symptomatology Questionnaire (ISQ) within a battery of standard personality scales administered to New Zealand expeditioners. The ISQ differentiated between poor performers ("...persistently selfish and bad-tempered in their manner, slovenly in habits and perfunctory in their work"), and good performers (N=25). Poor performers (N=6) were significantly more withdrawn, restless, and had difficulties in communication. Taylor reported that wintering parties (N=31) reported vivid dreams, clear memory, sexual thoughts, self appraisal, thought confusion, anger, guilt, tense-depression, optimism, and pleasant activities. There is no interpretation of the absolute scores on the ISQ, but it should be noted that "pleasant activities" was the highest rated point on the scale.

Emotional symptoms are accepted as being indicative of the coping process in the station environment. The symptom studies that have been reviewed vary in terms of

methodological approach and sample size, but there is general agreement regarding the types of symptoms, and their presence, if not prevalence. The effect of emotional disturbance on individuals is reported to be only infrequently dysfunctional. The more subtle, and more difficult to measure, effects on group interaction and performance have not been studied, and probably cannot be until sources of stress are identified.

The competing demands and priorities facing an individual suggest that to search for a simple cause-effect relationship between environment and emotion, or symptons of stress, is too simplistic. It has previously been argued (ch.2) that in spite of the cognitive appraisal process that is central to the transactional models of stress, individuals may not be able to match their felt emotion to the situation in their environment with which they have difficulty in coping.

The approach in the studies reviewed has been to use symptom studies as a measure of stress, and it would be interesting to attempt to use that sort of stress measure in conjunction with a measure that investigates stress based on the individuals' cognitive appraisal of specific situations, as a means of comparing stress levels.

What is Stressful in the Antarctic Station Environment?

The studies reviewed to this stage have relied upon the assumption that the station environment is stressful but have not identified what it is that expeditioners experience as stressful. Those few studies that have tackled this latter problem have relied upon interview, and participant observation, have been consistent in their findings, but relate to the early period of established expeditions.

Mullin (1960) and a team of psychiatrists interviewed US expeditioners (N=85) at their stations, immediately prior to the conclusion of their expedition. The main stresses identified by the interviewers were:

(a) the problem of individual adjustment to the group;
(b) the relative sameness of the milieu; and
(c) the absence of many accustomed sources of emotional gratification.

Interestingly, danger, hardship, and the cold climate were not reported as stresses. Although the argument will not be pursued directly in this study, it is considered, first, that interviewing after the event would need to be quite subtle in evoking admissions in this area, but second, that the potentially hostile physical environment may create a constant imbalance but an imbalance which individuals cannot resolve because they may not ever have to cope with the environment in a genuine threat situation. Coping mechanisms may be at a constant level of

arousal, on standby as it were, but never be put to the test, and individuals may not be aware that they have raised their readiness, or arousal, to a new level. The potential value of physiological measures to test such a hypothesis is acknowledged.

Having identified the sources of stress, Mullin concentrated upon the reported outcomes of stress. His comment regarding the frequency of headaches has been mentioned previously (p.24) and he further argued a possible link between headaches and inadequately expressed hostility. He also noted reported intellectual inertia in many expeditioners, and in some, impaired memory and concentration. These reactions were attributed to the lack of stimulation in the environment, and no association with performance decrement was made.

The absence of accustomed sources of gratification such as the emotional support provided by family and familiar situations, were seen to add to the burden of adaptation but were "rarely a subject of any serious continuing pre-occupation". An increase in appetite was seen to be a result of absence of other basic gratifications, and a part of an enhancement of oral needs. Isolation from women was not seen as a serious problem[7].

Mullin concluded that "...for most individuals the business of living for a year in an isolated polar station still makes serious demands on adaptive resources"(p.323). Whether the same conclusion can be drawn some 20 years later is of interest to this study.

Natani and Shurley (1974) credited Palmai (1963) as having "...apparently performed the most methodologically thorough participant observation study of behaviour in Antarctica"(p.96). Palmai wintered as Medical Officer at sub-Antarctic Macquarie Island in 1960 with 14 other expeditoners.

Palmai's sources of data included his medical log, taped records of group discussions taken on two regular occasions each week, and observation. Palmai confirmed the main stresses identified by Mullin (1960).

The taped records of discussions were analysed using Bales Interaction Process Analysis after Palmai's return from Macquarie Is.. Analysis showed a significant increase in the Negative Social-Emotional Response category during the year, but there was a constant high level throughout the year in interaction associated with the Task Area. This presumably reflected the task orientation of

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[7] Some countries, including Australia, now include women as members of Antarctic expeditions.

the expedition, but also, it is suggested, confirms the importance of task to adjustment. Palmai's subjective rating of group morale showed a decline for the third quarter. From his medical log, Palmai concluded that "...half the visits consisted in demands for counselling" and that the two main problem areas were marital relationships, and interpersonal conflict.

Lugg's (1977) observations of Davis Station expeditioners (previously reported on p.24) lacked the methodological support utilized by Palmai but suggested that conditions were not found to be stressful. Lugg also kept a written record of topics discussed throughout the year at meal-times and during recreation periods. His analysis supported that of Palmai in that station field work and domestic issues, other stations, and the Antarctic Divison,were the most frequently discussed topics. Superficially at least, these are related to task matters.

Using an approach that considered the whole wintering period, Rohrer (1961), cited in Natani, Shurley, and Joern (1973), identified three phases in an individuals' adaptation to Antarctic isolation. These were:

(a) An initial period of heightened anxiety positively correlated with the magnitude of individual subjective feelings of threat.
(b) A period of reduced anxiety accompanied by a generalized depression experienced to some extent by all members of the group.
(c) A terminal period during which individuals prepare for departure and show increased affect with overt expressions of hostility.(pp.387-388)

This finding suggests that individuals appraise the environment differently at different stages of the year, and again supports the advantage of accounting for time.

Natani and Shurley (1974) in reviewing studies at the US South Pole station[8] reported the major stresses to be the "...extreme cold, hypobaric hypoxia[9], markedly different light-dark cycles, lack of novelty, monotonous activity schedules, and 8 months of unbroken group social isolation with close confinement" (p.110). They argued, from their observations at the station, that "...social interaction provides opportunities for social comparison and social evaluation that serve direct anxiety-reducing functions" (p.110). Their measures of subjective stress (daily observations of the frequency with which men stayed up late at night, the frequency of

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[8]Mean mid-winter temperature -62°C, 2800 metres above sea level, approximately 800km from the coast.

[9]Oxygen deficiency in the air.

their social drinking, and the frequency of their "intrasubgroup interactions") led them to conclude that the measures "suggest that the beginning and the termination of the eight month's period of isolation are the periods of greatest stress." (p.110).

Data supporting Natani and Shurley's conclusion are drawn from a relatively small sample (N=19) and result from self-report of activities, and continuous unobtrusive observation of leisure time using an Adaptation Rating Scale. Neither the origin or development of the scale is described and some examples of negative behaviour appear to represent values that may either be inappropriate some 15 years on, or which would not be considered negative at an Australian station, e.g.:

> The individual was not observed working during leisure hours.
> The individual was observed consuming alcoholic beverages.
> The individual was not observed exercising.
> (Natani and Shurley, 1974, p.103).

It appears that the results obtained are certainly no more than suggestive of the conclusions drawn by Natani and Shurley. There is an attractive similarity between their suggestion regarding the occasions of most stress, and the phases of adaptation identified by Rohrer (1961) referred to on p.29, but an interesting point regarding the mid-winter period can be raised.

Rohrer described the mid-winter phase as being a phase of reduced anxiety and generalised depression, a description which could be argued to be in agreement with those writers (Law, 1960; Palmai, 1963) who have described mid-winter as a period in which morale is lower than at the beginning and end of the expedition. Accepting Natani and Shurley's conclusion and further accepting the similarity with Rohrer's phases, a conclusion could be drawn that the least stressful period is also the period of lowest morale.

The simplest explanation would be that the experience of stress finds different forms of expression at different times of the year. It may also be that the distinction between stress and arousal made by Cox (1978) is useful in considering changes in adaptation during the year, with perhaps level of arousal fluctuating rather than level of stress. The ability to make the distinction between stress and arousal would be useful, and this has been pursued in this study.

Whether the studies reviewed to this point are indicative of the environment at Australian stations, today, is not known. The main stresses identified by Mullin (1960) and Palmai (1963) are sufficiently broad to invite more detailed investigation, particularly as they seem to have neither included or excluded the factor of task ability, which has been found to be relevant to adjustment

to the station environment, and which together with role, has been found to be relevant in studies relating to work stress (Cooper and Marshall, 1978; Cox, 1978; Kahn et al, 1964; McGrath, 1976).

Natani and Shurley's review of studies at the US South Pole station raised some interesting areas, particularly regarding the role of social comparison and evaluation in adaptation, and more tentatively, the distinction between stress and arousal.

Conclusion

The assumption that living and working at an Antarctic station is stressful is part of the folk-lore of Antarctic expeditions. The origins of this assumption may be grounded in the heroic age of Antarctic exploration, but those studies that have systematically studied stress, have identified individual adjustment to the group, the sameness of milieu, and the absence of accustomed emotional support systems as the main sources of stress.

These sources of stress have been identified in the main from interview approaches, and support the factors of emotional stability and social compatibility established by studies which related performance measures to adjustment. Task ability was also reported in these latter studies, but it is not clear to what extent it was considered in the studies that identified sources of stress.

The participant observer studies of both Lugg (1977) and Palmai (1963) referred to the primacy of task as a topic of conversation in two Australian groups throughout the year. This may be a simple reflection of the task orientation of expeditioner groups, or it may reflect the social comparison and social evaluation processes observed by Natani and Shurley (1974), either way, the contribution of task factors to the experience of stress should be considered.

Although the general tenor of the studies reviewed was that stress, or symptoms attributed to the coping process, were not seriously dysfunctional for the individual, it does not follow that interest in the results of individuals' coping should be reduced. Gunderson's (1963) argument regarding the effect of a few individuals on group "solidarity and harmony" is accepted, and whilst both Mullin (1960), and Palmai (1963), have identified what is stressful, only Gunderson (1963), and Doll and Gunderson (1971) systematically approached the severity of emotional and psychosomatic symptoms.

The interesting relationship between stress and arousal has been raised by the theoretical approach of Cox (1978, Ch 2) and tentatively, from the conclusions of Rohrer (1961), and Natani and Shurley (1974). The latter writers have indicated that they are now pursuing an interest in

arousal and anxiety levels via a study of sleep patterns and physiological behaviour. Reports of intellectual inertia and impaired memory and concentration (Mullin, 1960), impaired cognition (Strange and Klein, 1973), and thought confusion (Taylor, 1973) may reflect lowered levels of arousal, rather than increased levels of stress.

Available studies refer predominantly to the period 1957-1970, and to US Antarctic stations. The studies presented by Owens (1975) refer to the 1960-65 ANARE, as do the studies by Palmai (1963) and Lugg (1977). There is therefore a case for updating the available information.

Methodologies based on interviews, self-report, and participant observation may be criticized, and indeed, the shortcomings of these approaches are acknowledged by many of the writers whose studies have been reviewed. The methodologies have been applied to meet situations where access is a severe constraint, and where minimum disruption to, or interference with, the working group has been seen as desirable.

In summary, it is argued that a systematic approach building upon the studies that have been reviewed, and taking advantage of the theoretical developments in the area of stress research since those studies were conducted, may be able to provide more detailed information regarding what it is in the Antarctic station that is experienced as stressful. The approach taken in this study is detailed in the following Chapter.

Chapter 4

Method

Part One: The Approach to the Study

Choice of methodology

The range of methods used in applied psychology provides difficulties for both researcher and critic alike. With regard to field settings there are advocates for the entirely unobtrusive approach (Proshansky and O'Hanlon, 1977; Webb, Campbell, Schwartz and Sechrest, 1966), for indirect methods such as interview, questionnaire, site visits (Nelson, 1973), and for more rigorous research based firmly on theory or model (Altman, 1973).

De Montmollin (1973), in commenting upon Altman's concern about most applied research being eclectic and atheoretical, pointed out that the need in applied research is directed toward managing rather than understanding, the applied setting. That is so, but in addition it is often the case that the field setting imposes constraints that force a compromise between the principles of scientific method and the need to obtain information. Arguments in support of the contribution that can be made by qualitative data (Patton, 1978) to scientific method are also directly relevant to studies of field settings.

There were two constraints that affected the conduct of this study, and these are outlined in the following two paragraphs.

Access. It was decided to include both the current (1983) expeditioner population, and a previous expeditioner population (from the expedition years 1980-1982), in this study. The current expeditioner population was available in toto during training, and in part[10], during the period immediately after arrival on station. The previous expeditioner population (1980-1982), except for the Casey station (1982) expeditioners, could only be contacted by mail.

Attitude. Reports of resistance to behavioural and medical research on the part of expeditioners suggested a cautious approach which was likely to have some appeal to expeditioners and which avoided the wholesale administration of psychological "tests", or which attempted any sort of situational control.

Accordingly, a questionnaire approach was chosen. Where access to expeditioners was possible, i.e. 1983 expeditioners before departure and after arrival, and 1982

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[10] At Casey Station, due to an offer by the Antarctic Division, Department of Science and Technology

expeditioners at Casey Station, it was decided to complement the questionnaire(s) with the Group Feedback Analysis (GFA) procedure described by Heller (1969). This procedure was chosen primarily because of its potential to provide a qualitative perspective to the quantitative data available from the questionnaire(s), not only in terms of enhancing the data, but also in terms of allowing the writer to assess the attitude taken towards the study. Further, the GFA procedure involves respondents in the research, and creates an opportunity for them to criticize, clarify or raise issues, and to make further contributions.

The study used a loose before and after design, with the 1983 expeditioners providing the "before" and the 1980-1982 expeditioners providing the "after", sample. With regard to the experience of stress, it is argued that the before-after design can be interpreted in terms of an expectancy vs. reality situation. By sampling the 1983 expeditioner population before departure, and after arrival, any changes in expectancy can be observed.

With regard to the latter point, it was decided to administer the questionnaire during field training, which occurs either one or two weeks after employment for an ANARE. For many expeditioners this is the first point at which they are confronted with detailed knowledge of some of the demands of the environment. Training in Hobart also involves separation from home for most expeditioners, and to a lesser extent, introduces station members to each other and to the group living experience. For the "after arrival" situation, the second week on station was chosen because by that time the ship on which the expeditioners had travelled to the station would have departed, and station routines (disrupted as they are in summer) would be being assimilated.

Choice of questionnaires

As a result of the unique nature of the Antarctic station, and the desire to conduct an Australian study, it was decided to construct a questionnaire, specific to the situation.

The decision to use the conceptual framework developed by McGrath (Figure 3, p.15) was discussed previously in Chapter 2. The very nature of the transactional models of stress, and McGrath's own comments, prevent an expectation that the six classes of stress of the McGrath framework will be identified in real-life, however, the framework allows a systematic approach to the choice of items, together with a structure within which to organise existing knowledge of the station environment.

The detailed rationale and construction of the Antarctic Station Environment Study (ASES) questionnaire is described in Appendix 1. The major section of the questionnaire centres upon the individual's experience of

the environment in terms of the degree to which specified demands of the situation were a source of pressure. From this it is hoped that major, common, sources of pressure can be identified.

Following Natani and Shurley's (1974) observation regarding the role of social comparison and social evaluation processes in social interaction, it was decided to incorporate within the questionnaire a section in which expeditioners could rate the experience of other expeditioners, together with their own, on specific situations. It was not known whether any differences should be expected, and no direction of difference was predicted.

As an introduction to the questionnaire, the 12 specific situations on which expeditioners were asked to rate themselves as well as others, were presented in a task requiring simple ranking, in order to check agreement between expeditioner samples.

In Chapter 2 it was argued (p.12) that an individual may recognize the experience of emotion more easily than the specific situation that led to that emotion. Following this argument and the results obtained from the symptom approach studies reviewed in Chapter 3, it was decided to use a developed measure of stress based on either mood, or stress-related symptoms. The selection of the questionnaire is described in Appendix 3.

The questionnaire chosen, the Stress-Arousal Check List (SACL), gives a measure of both stress and arousal, using mood adjectives. The nature of the instrument suggested that it would be useful for administration to the 1983 expeditioner population only. A copy of the SACL is included as Appendix 4

By using the SACL, stress and arousal can be monitored at points throughout the year. Any fluctuation in either stress or arousal may allow qualitative interpretation of the observations made by Rohrer (1961), and Natani and Shurley, 1974 (see Chapter 3, p.30).

Physiological measures

The need to develop a psychobiological approach in stress studies is generally accepted in the literature (Champness, 1981; Cox, 1978; Lazarus, 1966; Natani and Shurley, 1974; Singer, 1980). The possibility of incorporating physiological measures in this study was considered but rejected for the following reasons:

(a) the existence of as yet unpublished data from the 1980/81 International Biomedical Expedition to Antarctica which included physiological measures used routinely in stress research; and,

(b) a perceived inability to impose control measures (e.g. on food and drink intake; hours of working; number of hours worked) on an expeditioner group either during field training, or in the first weeks at a station.

Trial Administration

The entire procedure, i.e. SACL, draft ASES, followed by a Group Feedback Session, was trialled in Hobart in July 1982, using 10 previous expeditioners currently employed by the Antarctic Division, Department of Science and Technology. The previous expeditioners were used as an expert panel to:

(a) discuss the research approach;
(b) discuss the two questionnaires, particularly the ASES questionnaire; and
(c) give the writer practice in the GFA technique.

The panel consisted of a former Officer-in-Charge, a Medical Officer, and scientific and support personnel.

Following discussion, the Introduction to the ASES questionnaire was edited with a view to simplifying the prose. Improvements were made to the instructions at the beginning of each Section, and two new items (18, 34) that were raised independently by three of the 10 panel members, were introduced. Finally, Section 5 (Reason for applying) was added for Antarctic Division use, at the suggestion of the panel. It was possible to include this without difficulty, and it provided a suitable conclusion to the questionnaire.

Because of the limited number of subjects available for study, and the problems of access, the questionnaire did not undergo the rigorous statistical development generally accepted as necessary for survey questionnaires.

Tense changes were incorporated in instructions and items in order to reflect the different stages at which the questionnaire was administered. A copy of the questionnaire version used in this study for the 1980-82 previous expeditioner population is included as Appendix 2.

A summary of the sources of data, the respondents' tasks, and the aims of the study, is contained in Table 3.

Table 3

Data Source : Description of Respondents' Task and Researcher's Aims

Data Source (a)	Repondents' Task (b)	Researchers' Aims (c)
ASES		
Section 1	. Provide biographical data	. Check sample against parent population. . Provide independent variables.
Section 2	. Rank 12 statements made by previous expeditioners in order of how stressful they would have been for those previous expeditoners.	. Qualitative assessment of rank order. . Investigate degree of correlation between "before" and "after" populations. . Investigate inter-rater agreement.
Section 3	. Using same 12 statements as Section 2, rate statements on 3-point scale in terms of how frequently a source of stress for: (a) Self, and (b) Others. (Scale: Not source of stress, occasional source of stress; frequent source of stress).	. Derive rank order from mean ratings for Self for each statement and compare with rank order for previous expeditioners (Section 2) and for Others. . Investigate difference on each statement between Self, and Others, rating. . Investigate change in rating from Before Departure to After Arrival, for 1983 Expeditioners.

Table 3 (cont)

(a)	(b)	(c)
Section 4	. Rate 36 items on 5-point scale in terms of the degree of pressure represented by each item. (Scale: Not a source of pressure; a source of slight; moderate; considerable; or extreme pressure) . Add, and rate, areas not covered by the questionnaire.	. Establish items commonly rated as source of pressure. . Compare each sample. . Investigate commonly rated items using independent variables. . Qualitative analysis of open-ended question in conjunction with analysis of Group Feedback discussions.
SADI	. Rate 20 mood adjectives on 4-point scale according to how the adjective describes respondents' mood during the last week. (Scale: Definitely applies; slightly applies; not clear/cannot decide; does not apply).	. Investigate changes in Stress and Arousal levels in 1983 expeditioners Before Departure and After Arrival.
GROUP FEEDBACK ANALYSIS	. Take part in group discussion orientated toward a summary of Sections 2 and 3 of the ASES questionnaire, and those items which were rated 3 (source of moderate pressure) or higher in Section 4 of the ASES Questionnaire. . Raise any issues considered as sources of stress.	. Elicit discussion on questionnaires, and particular items. . Conduct general discussion relevant to the study. . Assess attitude toward the study.

Part Two: Collection of Data

Subjects

A summary of the number of respondents that participated in the study is contained in Table 4.

Table 4

Number of Respondents Completing the Questionnaires

Samples	Questionnaire SACL	ASES
1980 - 1982 Previous Expeditioners (PE)	N/A	179
1983 Expeditioners		
Before departure (BD)		
Orientation Week	74	N/A
Field Training Week	80	89
After arrival (AA)	36	44

Procedure - Timing

The administration of the questionnaires extended from September 1982 to February 1983, and is summarized in Table 5.

Procedure - General

A standard introduction was used on each occasion that the questionnaires were administered. The introduction identified the general aims of the study and emphasized the value of seeking the experience of expeditioners in achieving those aims. The voluntary nature of the study was emphasized, as was the fact that completed questionnaires would not become a part of personal files, and would not be available to the Antarctic Division.

Questionnaires were administered in the order, SACL, ASES. They were completed by expeditioners in a group situation which allowed for supervision and control. Conditions at Casey station were good in terms of lighting, space, and time of administration. At the Field Training at Lake Augusta, it was the opposite. Expeditioners were assembled either late in the evening after a tiring day, or early in the afternoon between breaks in the training schedule. Cooperation was excellent, but the scheduling of the administration, and the general physical surroundings may have worked against subject concentration. The conditions were not as planned and were less than ideal.

Table 5
Study Timetable

Date	Action
September 1982	. Orientation Week. Aim of study outlined to 1983 ANARE expeditioners. SACL administered to obtain base-line data.
	. Field Training. SACL/ASES questionnaires administered on either Day 4 or 5 of the two field training weeks at Lake Augusta, Central Tasmania. (Week 1, N=67; Week 2, N=22). Group Feedback sessions conducted.
October 1982	. ASES questionnaire mailed to 170 expeditioners from the years 1980-81. Expeditioners wintering again in 1983 were excluded. Copy of covering letter included as Appendix 5.
November 1982	. SACL/ASES questionnaires administered to 1983 expeditioners at Macquarie Is. (N=16) by MO, during second week on station.
December 1982	. SACL/ASES questionnaires administered to advance party of 1983 expeditioners at Casey Station (N=10) and Group Feedback discussion held.
	. ASES questionnaires administered to 1982 expeditioners at Casey station (N=30); two Group Feedback sessions held.
January 1983	. SACL/ASES questionnaires administered to remainder of 1983 expeditioners (N=18) at Casey Station, by MO.
February 1983	. ASES questionnaire mailed to remainder (N=72) of 1982 expeditioners. Covering letter similar to Appendix 5.
	. Follow-up/thankyou letter (Appendix 6) mailed to 1980-81 expeditioners.

The Group Feedback sessions were held as closely as practicable after the administration of the questionnaires and were recorded on tape. Details of the sessions are shown in Table 5.

Table 6

Group Feedback Sessions

Group Feedback Session		N
Lake Augusta, Tasmania		
Field Training Week 1	Group 1	15
	Group 2	7
Field Training Week 2	Group 1	20
Casey Station, Antarctica		
1982 Expeditioners	Group 1	10
	Group 2	7
1983 Expeditioners	Group 1	10
Macquarie Island		
1983 Expeditioners [a]	Group 1	16

[a] Conducted by MO, all other sessions conducted by the writer.

Limitations

There are several shortcomings which are seen to limit the degree of analysis, and the conclusions, that can be applied to the data. These are discussed.

The conditions under which the questionnaires were completed varied considerably. This was raised on p.39, and may have had greatest impact for the SACL, which has been demonstrated to be sensitive to time of day (Watts, Cox, and Robson, 1981) and has usually been used following a specific task (Burrows, Cox and Simpson, 1977)[11]. Whilst control over the 1983 expeditioners was maintained, there was of course no control of previous expeditioners during the completion of mailed questionnaires.

Because of repeated administrations current expeditioners were asked to identify themselves by number on both the SACL and the ASES questionnaire, whereas the previous expeditioner sample responded anonymously to the ASES questionnaire, and did not complete the SACL. The lack of anonymity caused some unfavourable comment in Group Discussions.

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[11] Although in these studies the instructions concerning the period for which the subjects responded was much shorter

The previous expeditioner sample consists of three groups of varying degrees of recency at an Antarctic station. The 1982 expeditioners either completed the questionnaire at their station or very shortly after their return to Australia, whilst the 1981 and 1980 expeditioners were one or two years respectively away from their expedition year.

Finally, the writer had varying degrees of contact with the respondents, ranging from participation in the same training course, presence at the same station, and personal administration of the questionnaire(s), through to acquaintance from previous expeditions or no previous contact at all.

The limitations are acknowledged, although it is suggested that they may be inherent in a field study such as this. It is further suggested that they can be tolerated in a preliminary investigation, provided the statistical analyses, and the conclusions drawn remain within the limits imposed by the conditions under which the data were collected.

Chapter 5

Results

The results are presented in four parts:

(a) Part One : Are the samples representative?

(b) Part Two : The SACL.

(c) Part Three : The ASES Questionnaire.

(d) Part Four : Additional Sources of Pressure Identified by Respondents; ASES Questionnaire and Group Feedback Sessions.

Part One: Are the Samples Representative?

1983 Sample

Of the 104 expeditioners (excluding foreign exchange personnel) who are members of the 1983 ANARE, 89 participated in this study. The difference resulted because some expeditioners did not attend Field Training, and some exercised their option not to participate in the study. The sample is considered to be representative.

The 1983 After Arrival (AA) sample (N=40) consists of respondents from Macquarie Island, and Casey, Stations only. It is not argued that it is representative.

1980-82 Previous Expeditioner (PE) Sample

Table 7 shows the sample size and response rate for the 1980-82 (PE) populations.

Table 7

Sample Size and Response Rate for 1980-82 (PE) Population

Year	Total Expeditioner Population[a]	Sample Size	Response Rate (%)
1980	90	53	59
1981	96	57	59
1982	105	69	66
TOTAL	291	179	62

[a]Excludes expeditioners serving with 1983 expedition

The overall response rate of 62 percent is considered satisfactory although a higher rate was hoped for. Questionnaires were only sent to 170 out of the 186 total for the years 1980-81 because of record deficiencies, and at least 15 percent of that 170 did not receive the questionnaire (the figure for questionnaires returned

undelivered by Australia Post). The response rate for those who received the questionnaire is therefore better than that indicated in Table 7. Although the questionnaire was anonymous, many respondents identified themselves and contributed either informative notes or letters, suggesting an interested and genuine response.

A further breakdown of response rates by station by year is provided in Appendix 7. The variation in response rate, and the small numbers involved from some stations, supports the initial preference to treat the 1980-1982 (PE) sample as one. This decision is seen to be consistent with the aim of the study, namely, a preliminary investigation seeking to identify common areas of stress.

Chi-square was used in order to establish whether the respondent sample was representative of the parent population from which it was drawn. The two populations were compared on the following characteristics:

(a) age;
(b) occupational status;
(c) marital status; and
(d) previous ANARE experience.

Data for the three parent populations were extracted from Australian Army Psychology Corps files by the writer[12]. Data for the respondent samples were provided by the respondents. Frequency data are included in Appendix 8, and Chi-square results are shown in Table 8:

The 1980-82 (PE) sample is therefore accepted as being representative of the total expeditioner population from which it was drawn.

Table 8

Chi-square Analyses of 1980-82 Parent Population vs. 1980-82 Sample, on Selected Characteristics

Characteristic	x^2	df	Significance
Age	3.47	5	ns
Occupational category	2.80	2	ns
Marital status	2.91	1	ns
Previous experience	.05	1	ns

[12]Files for seven expeditioners were missing, leaving a total population of N=284 for the Chi-square analyses.

1980-82 (PE) vs 1983 (BD) Samples

Chi-square was used to compare the 1983 (BD) sample with the 1980-82 (PE) sample on the same characteristics used previously. Results are shown in Table 9:

Table 9

Chi-square Analyses of 1980-82 (PE) Sample vs. 1983 (BD) Sample on Selected Characterisitics

Characteristic	X^2	df	Significance
Age	9.27	5	ns
Occupational category	1.28	2	ns
Marital status	.61	1	ns
Previous expeditions	.81	1	ns

The 1980-82 (PE) and 1983 (BD) samples are therefore considered to be sufficiently similar to allow comparisons to be drawn from questionnaire responses.

The 1980-82 (PE) and the 1983, samples include 5 and 8 females respectively. These numbers are too small to allow consideration of sex differences, and all analyses have used total samples.

Part Two: The Stress-Arousal Check List (SACL)

The SACL was administered on three occasions to the 1983 expeditioner sample, twice before departure, and once after arrival. The first administration was conducted during Orientation Week, which at that time consisted mainly of a series of lectures in the first week of employment. This administration was used to provide base line data on the SACL although plainly the obtained scores cannot be accepted as representative of scores that would have been obtained prior to employment.

The SACL provides a score between zero and 10 for both Stress and Arousal. Results are shown in Table 10.

These scores are interpreted as indicative of low levels of stress, and relatively high levels of arousal, although as the range of scores shows, there were appreciable individual differences.

Table 10

SACL: Mean, Standard Deviation, and Range, of Stress and Arousal Scores for 1983 Expeditioners

Stress/Arousal	Statistic	Orientation Week N=74	Field Trg Week N=80	After Arrival N=36
Stress	Mean	1.61	1.28	1.19
	SD	1.79	1.80	1.82
	Range	0-7	0-8	0-6
Arousal	Mean	6.22	7.14	7.11
	SD	2.72	2.75	1.80
	Range	0-10	1-10	4-10

The product moment correlation co-efficients between Stress and Arousal for each adminisatration were -.09, -.12, and -.09 respectively. These figures are similar to the equivalent statistic (.10) reported by King, Burrows, and Stanley (1983) for Australian samples, and add further support to the claim that the relationship between Stress and Arousal is orthogonal.

With one exception mean Stress scores for the expeditioner sample were lower than those reported for the varied samples used by King et al (1983), whilst the mean Arousal scores tended toward the high scores reported by those writers.

Repeated measures t-tests were used to measure change from one administration to the next. Results are shown in Table 11.

Table 11

SACL: Repeated Measures t-tests between Orientation Week and Field Training (two weeks), and between Field Training and After Arrival (three months)

Period	Stress t	Stress sig	Arousal t	Arousal sig
Orientation Week to Field Training (N=70)	.94	ns	2.58	.05>p>.01
Field Training to After Arrival (N=29)	.09	ns	.49	ns

The significant increase in Arousal from Orientation Week to Field Training, and the similar level (see Table 10) After Arrival, may be the result of the physical activity and the novelty of the situations common to both activities. The data in Tables 10, and 11, may

also suggest that Arousal, increased to cope with the perceived demands of these situations, and that there was no experience of stress.

With hindsight, it would have been worthwhile to have attempted more frequent administrations of the SACL, and the results of subsequent administrations at mid-year and end-of-year will be necessary for further analysis of the relationship between Stress and Arousal. Those results will form part of a further study.

Part Three: The Antarctic Station Environment Study (ASES) Questionnaire

ASES: Section 2

In this Section of the questionnaire respondents were asked to rank 12 statements, attributed to previous expeditioners. in order of "...how much you think they could have been stressful for those previous expeditioners."

Table 12 records the three highest (ranks 1,2,3) and the three lowest (ranks 10,11,12) ranked statements for each of the three samples.

During the questionnaire administration, and in Group Feedback sessions, some 1983 (BD) respondents stated that as they had not yet experienced station life and knew very little about it, they found it difficult to discriminate between statements that applied to previous expeditioners. The number of missing values perhaps reflects these criticisms, but there were also a number of errors made in the ranking procedure. Despite this, Table 12 shows an apparent agreement between the three samples, particularly on the statements ranked highest.

Table 12

ASES Section 2: Three Highest and Three Lowest Ranked Statements for each sample

Rank	1980-82 (PE) N=162	1983 (BD) N=74	1983 (AA) N=37
1	Separation from immediate family and friends	Separation from immediate family and friends	Separation from immediate family and friends
2	Lack of privacy	Lack of privacy	Inability to "get on" with some members of the expedition
3	Inability to "get on" with some members of the expedition	Inability to "get on" with some members of the expedition	Living and working with the same small group of people
10	Being expected to assist with tasks other than those for which they were employed.	Being supervised by an individual with limited or no knowledge of their particular field or trade	Pressure to conform to the wishes of the majority
11	Risk of injury or death	Insufficient work experience	Risk of injury or death
12	Insufficient work experience	Being expected to assist with tasks other than those for which they were employed	Being expected to assist with tasks other than those for which they were employed

Table 13 shows the rank order for all 12 statements, using the order for the 1980-82 (PE) sample as the reference.

Table 13

ASES Section 2: Rank Order of Statements for each Sample

Statement	1980-82 (PE) N=162	1983 (BD) N=74	1983 (AA) N=37
Separation from immediate family and friends (SELF)	1	1	1
Lack of privacy (BEHAVIOUR SETTING)	2	2	4
Inability to "get on" with some members of the expedition (SELF)	3	3	2
Living and working with the same small group of people (SOCIAL ENVIRONMENT)	4	5	3
Pressure to conform to the wishes of the majority (SOCIAL ENVIRONMENT)	5	8	10
Being restricted to the general area of the station for most of the year (PHYSICAL ENVIRONMENT)	6	4	6
Boredom (BEHAVIOUR SETTING)	7	6	7
Being supervised by an individual with limited or no knowledge of their particular field or trade (ROLE)	8	10	8
Responsibility associated with the station being dependent upon their specific occupational skill (TASK)	9	7	5
Being expected to assist with tasks other than those for which they were employed (ROLE)	10	12	12
Risk of injury or death (PHYSICAL ENVIRONMENT)	11	9	11
Insufficient work experience (TASK)	12	11	9

The Spearman Rho for the three samples were:

1980-1982 (PE) with 1983 (BD) : $r_s = .89$
1980-1982 (PE) with 1983 (AA) : $r_s = .79$
1983 (BD) with 1983 (AA) : $r_s = .88$

The high correlations are interpreted as a confirmation of agreement between samples. If it is assumed that the 1980-82 (PE) sample ranked the statements on the basis of their own experience, and that their rankings represented the "reality" situation, then the expeditioners of both 1983 samples recognized that reality, at least on the 12 statements that were presented. Considering the "complaints" raised in Group Feedback sessions concerning the difficulty of the ranking task, the level of agreement is surprising.

Kendall's co-efficient of concordance was used to check rater agreement within samples, results were:

1980-1982 (PE) : W= .22, X^2= 397.53, p<.001
1983 (BD) : W= .24, X^2= 195.45, p<.001
1983 (AA) : W= .18, X^2= 74.93, p<.001

These results permit rejection of a null hypothesis of no agreement between raters and add a further dimension to the level of agreement already found.

It is noted that the largest discrepancies in ranking that do occur, are between the 1983 (AA) and the 1980-82 (PE) samples, on the statements "Pressure to conform to the wishes of the majority" and "Responsibility associated with the station being dependent upon their specific occupational skill". On these two statements, the change in direction of rankings suggests the actual experience of being at a station changes the respondents' perception of how the environment may have been experienced by previous expeditioners.

The results from this Section show agreement between the expeditioners within each population, and between each population, in ranking 12 statements. "Separation from immediate family and friends", and "Inability to 'get on' with some members of the expedition", both categorized within the Self category of sources of stress, are commonly ranked as the most stressful of the 12 statements, although the latter statement may also be a reflection of Social Environment.

ASES: Section 3

Using a 3-point scale, respondents were asked to rate each of the 12 statements used in Section 2, in terms of "how stressful you feel it might be (was), firstly for

yourself, and secondly for the other expeditioners..."[13]

The rank orders derived from the mean ratings for each statement and for each sample is shown in Appendix 9. Three sets of correlations were considered to be of interest at this stage, first, that between the mean ratings for Self vs. the rank order applied to the statements in Section 2; second, that between the mean ratings for Self vs. the mean ratings for Others; and third, that between each sample on the mean ratings for Self. Results are shown in Table 14.

Table 14

ASES Section 3: Spearman Rank Order Correlations

	Correlation Description	r_s 1980-82 (PE)	1983 (BD)	1983 (AA)
1.	Mean rating "Self" vs. Rank Order Previous Expeditioners (Section 2)	.97	.92	.53
2.	Mean rating "Self" vs. mean rating "Others"	.90	.74	.81
3.	Mean rating "Self" between samples	r_s		
	1980-82 (PE) with 1983 (BD)	.77		
	1980-82 (PE) with 1983 (AA)	.49		
	1983 (BD) with 1983 (AA)	.38		

The interpretation of the results obtained is necessarily qualitative, however, the variation in the size of the correlations particularly those involving the After Arrival sample suggests that even a brief experience of being at the station varied the perception of the likely impact of the situations described by the 12 statements.

The same high level of correlation evident between the three samples in ranking the 12 statements in Section 2 of the questionnaire, was not carried over into the rank order derived from mean ratings for Self in Section 3, except between the "inexperienced" 1983 Before Departure, and the 1980-82 Previous Expeditioners samples.

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[13] For the 1980-92 (PE) sample the instruction continued "... with whom you wintered".

For the 1983 (BD) sample the instruction continued "... who have been selected for service with ANARE in 1983".

There is an interesting difference between the high correlation (r_S=.81) for the 1983 (AA) sample on the rankings for Self and Others within the same expedition year, and the lower correlation (r_S=.53) for the same sample with the Section 2 rank order applied to "other", unidentified, expeditioners from previous years.

It must be emphasized that the rank order used in this analysis has been derived from mean ratings that fall within a relatively narrow range.

Comparison of ratings: Self vs Others

The Self and Others ratings were compared using repeated measures t-tests. At the time of the questionnaire construction it was considered that there may have been differences between these two ratings but no direction of difference was postulated. Results are shown in Table 15.

Without exception, the direction of differences between mean ratings shows the statements being rated as a more frequent source of stress for Others than for Self. The differences are consistently significant and whilst many of the differences between means are not substantive, it is the consistency of the direction of the difference that is of interest. The possibility of there being a significant difference between ratings was evident before the Group Discussions, but the difference was not raised in those discussions because the ASES was to be administered again.

It is also worth noting that whilst only one mean rating for Self is greater than 2 (an occasional source of stress), there are several statements for which the mean ratings for Others lie between 2, and 3 (a frequent source of stress). These statements are shown in Table 16.

Table 15

ASES Section 3: Mean Rating and Significance Level for Self and Others for each Sample

	Statement	1980-82 (PE) N=175[a]			1983 (BD) N=77[b]			1993 (AA) N=39		
		Self	Others	Sig Level[c]	Self	Others	Sig Level[c]	Self	Others	Sig Level[c]
1	Lack of Privacy	1.77	2.18	***	1.79	2.09	***	1.69	1.97	**
2	Responsibility associated with the station being dependent upon your specific occupational skill.	1.51	1.90	***	1.68	1.77	ns	1.74	2.03	*
3	Separation from immediate family and friends.	1.94	2.49	***	2.01	2.36	***	1.97	2.23	*
4	Risk of injury or death	1.37	1.57	***	1.57	1.77	*	1.67	1.79	ns
5	Living and working with the same small group of people	1.74	2.17	***	1.74	1.97	***	1.49	1.90	***
6	Insufficient work experience.	1.35	1.59	***	1.44	1.66	**	1.56	1.72	ns
7	Boredom	1.52	2.09	***	1.64	2.14	***	1.46	1.72	*

Table 15 (cont)

	Statement	1980-82 (FE) N=175[a]			1983 (BD) N=77[b]			1983 (AA) N=39		
		Self	Others	Sig Level[c]	Self	Others	Sig Level[c]	Self	Others	Sig Level[c]
8	Inability to "get on" with some members of the expedition	1.75	2.27	***	1.62	2.10	***	1.72	2.00	**
9	Being expected to assist with tasks other than those for which you are employed.	1.31	1.78	***	1.23	1.60	***	1.23	1.62	*
10	Pressure to conform to the wishes of the majority	1.57	1.93	***	1.58	1.86	***[c]	1.54	1.87	*
11	Being restricted to the general area of the station for most of the year	1.70	2.02	***	1.77	2.03	***	1.62	2.05	**

Table 15 (cont)

Statement	1980-82 (PE) N=175[a]			1983 (BD) N=77[b]			1983 (AA) N=39		
	Self	Others	Sig Level[c]	Self	Others	Sig Level[c]	Self	Others	Sig Level[c]
11. Being supervised by an individual with limited or no knowledge of your particular field or trade	1.55	2.04	***	1.49	1.92	***	1.74	2.03	*

* .05>p>.01

** p<.01

*** p<.001

[a]Beacause of missing values, the sampe size for Statements 1,2,7,10 varied by one.

[b]Because of missing values, the sample size for Statement 10 varied by one.

[c]Using repreated measures t-tests.

Table 16

ASES Section 3: Statements for which Mean Rating for Others lies between "Occasional" and "Frequent" Source of Stress for each Sample

Statement	Mean Rating (standard deviation) 1980-82 (PE)	1983 (BD)	1983 (AA)
Separation from immediate family and friends	2.49 (.57)	2.36 (.65)	2.23 (.58)
Inability to "get on" with some members of the expedition	2.27 (.55)	2.10 (.50)	2.00 (.51)
Lack of privacy	2.18 (.54)	2.09 (.54)	-
Living and working with the same small group of people	2.17 (.58)	-	-
Boredom	2.09 (.64)	2.14 (.56)	-
Being supervised by an individual with little or no knowledge of your particular field or trade	2.04 (.70)	-	2.03 (.67)
Being restricted to the general area of the station for most of the year	2.02 (.64)	2.03 (.61)	2.05 (.65)
Responsibility associated with the station being dependent upon your specific occupational skill	-	-	2.03 (.58)

The results suggest that all expeditioners see their companions either as experiencing stress, or likely to experience stress, more frequently than they do themselves. This may reflect a general coping strategy, or it may be that different methods of appraisal or observation are applied to the two tasks. It also raises the consideration that the ratings made for Others provide a more accurate indication of the frequency with which the situation described by the statements led, or may lead, to an experience of stress.

Change in Ratings from Before Departure to After Arrival

Some tentative conclusions regarding change were drawn from the correlation analyses reported in Table 14. These suggested that the experience of being on station may have changed the respondents' appraisal of their environment, but the quantitative base for those conclusions was not strong.

Ratings for Self, and Others, were compared using repeated measures t-tests and the results are shown in Table 17. Only data from Casey and Macquarie Is. Stations were available, the sample is small [14] and is not claimed to be respresentative of the total expeditioner population.

Results suggest that there is no change from the Before Departure to the After Arrival situation for respondents asked to rate the frequency with which the statements were likely to be a source of stress for themselves. For Others, respondents perceived changes for three statements only, namely:

Higher rating After Arrival

- Responsibility associated with the station being dependent upon your specific occupational skill

Lower rating After Arrival

- Boredom
- Lack of privacy

For each statement the direction of change was the same as that for the Self ratings.

ASES: Section 4

The composition of this Section is discussed in detail in Appendix 1. Briefly, respondents had to rate 36 items on a 5 point scale (1= not a source of pressure at all; through slight, moderate, considerable, to 5 = a source of extreme pressure). The 36 items were divided into six categories: Task, Role, Behaviour Setting, Physical Environment, Social Environment and Self, but these categories were not identified to the respondents.

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[14] The sample is smaller than the total available population at the two stations, mainly because not all expeditioners from these stations were present at the first (Before Departure) administration of the questionnaire.

Table 17

ASES Section 3: 1983 (BD) and (AA) Samples Mean Rating for Self and Others

Statement	Self (N=30)			Others (N=29)		
	1983 (BD)	1983 (AA)	Sig[a] Level	1983 (BD)	1983 (AA)	Sig Level
. Lack of privacy	1.77	1.70	ns	2.17	1.90	*
. Responsibility associated with the station being dependent on your specific occupational skill	1.55	1.81	ns	1.70	2.13	**
. Separation from immediate family and friends	2.03	2.10	ns	2.37	2.17	ns
. Risk of injury or death	1.52	1.71	ns	1.70	1.83	ns
. Living and working with the same small group of people	1.71	1.45	ns	2.00	1.93	ns
. Insufficient work experience	1.45	1.61	ns	1.67	1.83	ns
. Boredom	1.55	1.52	ns	2.23	1.70	***
. Inability to "get on" with some members of the expedition	1.58	1.65	ns	2.20	1.93	ns
. Being expected to assist with tasks other than those for which you are employed	1.23	1.26	ns	1.53	1.53	ns
. Pressure to conform to the wishes of the majority	1.61	1.45	ns	2.03	1.86	ns
. Being restricted to the general area of the station	1.65	1.65	ns	1.97	2.07	ns

Table 17 (cont)

Statement	Self (N=30) 1983 (BD)	Self (N=30) 1983 (AA)	Self (N=30) Sig[a] Level	Others (N=29) 1983 (BD)	Others (N=29) 1983 (AA)	Others (N=29) Sig Level
Being supervised by an individual with limited or no knowledge of your particular field or trade	1.42	1.71	ns	1.90	2.00	ns

[a]Using repeated measures t-tests

* .05>p>.01

** p>.01

*** p>.001

Content Validity

To provide an indication of the effectiveness of the scale, co-efficient alpha was computed for each of the six categories of items, and for the total 36 items, for the three samples. Results are shown in Table 18. Whilst the lower values for the sub-groupings of items were expected, the higher values for the total 36 items are encouraging.

The high co-efficient alphas for the total scale are not sufficient to argue that the scale has content validity, and therefore a product moment correlation between this scale, and the Stress score from the SACL, was computed, using the SPSS list wise deletion option. Only the 1983 samples could be used and results are shown in Table 19.

Again, the results are encouraging but should be interpreted cautiously. Both scales indicate overall low levels of stress and the correlation results need to be complemented by results from further administrations. Additionally, the ASES items require respondents to assess the situation into which they are going and in effect, to predict what will be sources of pressure. The SACL on the other hand, registers stress levels for a retrospective period. In gross terms, repondents as a group are saying that they are not stressed, and do not expect to be.

Table 18

ASES Section 4: Co-efficient Alpha for Sub-Groups of Items, and for all Items, for each Administration

Category (items)	Sample		
	1980-82(PE) N=173	1983(BD) N=78	1983(AA) N=37
Task (1-6)	.53	.61	.64
Role (7-12)	.66	.79	.78
Behaviour Setting (13-18)	.62	.67	.60
Physical Environment (19-24)	.58	.71	.74
Social Environment (25-30)	.75	.67	.78
Self (31-36)	.67	.68	.76
Total Scale	.89[a]	.92[b]	.93[c]

[a]Mean Rating = 1.83
[b]Mean Rating = 1.77
[c]Mean Rating = 1.85

Table 19

Correlation of ASES Section 4 with SACL Stress Scale: 1983 (BD) and (AA) Samples

Sample (N)	Product Moment Correlation	Significance
1983 (BD) (78)[a]	.34	p<.01
1983 (AA) (33)[b]	.52	p<.01

[a]Mean score ASES = 66.6, SACL stress = 1.29
[b]Mean score ASES = 63.5, SACL stress = 1.00

There is some evidence to suggest that the low level of stress as measured by the ASES, reflected a response style. In Group Feedback discussions conducted with 1983 expeditioners before departure, some expeditioners expressed concern that the questionnaire responses would form part of a final filter in the selection process, and that, together with having had to identify themselves on the questionnaires, meant that they had been less than frank. One expeditioner suggested "I think that you would have had more of an open mind if you didn't think it was going to be used to check your suitability", and there were some supporters for that comment. Another commented, "It's just that word stress in front of you and everyone gets the idea 'I wouldn't be under stress'".

Results from Section 3 of the ASES have indicated that respondents rated themselves lower than Others. It cannot be concluded that they rate themselves low in absolute terms, but that is a possible interpretation. Intuitively, the writer would argue that any social desirability response, at least before departure, would operate in the direction of depressing the ratings, but there is no real evidence to support this.

The overall low level of stress as measured by the ASES, does serve to emphasize those areas of common sources of pressure that have been identified, and which are presented in the following section.

Identification of Common Sources of Pressure

Two arbitrary decisions were made in identifying common sources of pressure. First, it was decided that any response rated 3 (a source of moderate pressure) or higher, would be of interest. Second, it was decided that where 25 percent or more of the population rated an item 3 or higher, that item could be considered indicative of a common source of pressure.

Table 20 shows the items that met the criteria and also shows the percentage of respondents who rated the items as a source of either moderate, considerable, or extreme

pressure. The table is further broken down to show those statements that met the criteria for:

(a) all three samples;
(b) the 1980-82 (PE) Sample Only; and
(c) the 1983 (BD) and (AA) Samples Only.

From Table 20, the following items are consistently and particularly highly rated by each sample:

. The planning by the Antarctic Division for my work area.
. The importance of my job to the expedition.
. The threat of fire.
. The absence of women.
. Separation from my family and friends in Australia.
. Being unable to attend to problems at home.

Comments on these items are provided in the following paragraphs.

The Planning by the Antarctic Division for My Work Area. Discussion with expeditioners during Group Feedback sessions indicated that this item may be picking up a general response of dissatisfaction with the Antarctic Division, and this is supported by the number of references to the Antarctic Division as a source of pressure made in the open-ended question at the end of Section 4 (see Tables 23, 24). One expeditioner summed up the feelings of many with the comment, "You have a feeling that no matter how much you achieve and perform someone in ANARE Head Office will ask for more or redirect you without thanks and with minimal response to any requests for improving the status quo". Another expeditioner referred to a secondary effect of this dissatisfaction, "You get a little bit upset with the Division and then you snap at your mates". Dissatisfaction with the Antarctic Divison was often expressed in an emotional manner and there are obviously some quite complex processes operating, as observed by Macpherson (1977) and Natani and Shurley (1974). The general area of relations between expeditioners and the Antarctic Division will be discussed at a later stage.

The Importance of my Job to the Expedition. The high response rate on this item is interesting. Previous researchers (Gunderson, 1974; Owens, 1975) have attested to the important part which task ability plays in adjustment at Antarctic stations, but neither task, nor role[15], have been cited previously as a source of stress. The response suggests that the need to demonstrate task ability as a means of achieving adjustment (and acceptance?) may have an attendant cost.

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[15]This item was included in the Task category but could perhaps be seen to relate to Role.

Table 20

ASES Section 4: Percentage Response by Sample Grouping, for Items Rated "source of moderate pressure" or Higher by 25 percent or more of the Respondent Samples

Sample Group/Item	1980-82 (PE) N=179	1983 (BD) N=79	1983 (AA) N=40
All three samples			
. The planning by the Antarctic Division for my work area (TASK)	47	31	47[a]
. The importance of my job to the expedition (TASK)	39	43	36[a]
. Restrictions on personal privacy (BEHAVIOUR SETTING)	32	33	27
. Being so isolated from Australia and other stations (BEHAVIOUR SETTING)	25	32	27
. The threat of fire (PHYSICAL ENVIRONMENT)	38	49	40
. The absence of women (SOCIAL ENVIRONMENT)	46[b]	37	42
. Separation from my family and friends in Australia (SELF)	48	56	56
. Being unable to attend to problems at home (SELF)	36	41	48
1980-82 (Previous Expeditioner) Sample			
. Being generally restricted to the immediate vicinity of the station (PHYSICAL ENVIRONMENT)	27[b]	(22)	(17)
. Differences between the interests and activities of the expeditioners on the station (SOCIAL ENVIRONMENT)	27	(15)	(7)
. The feeling of having to change my behaviour to suit others (SOCIAL ENVIRONMENT)	26	(13)	(15)
. Having to cope with some of the "way out" social behaviour that occurred (SOCIAL ENVIRONMENT)	27	(15)	(7)

. Perhaps having to sort out differences of opinion between expeditioners on the station (SOCIAL ENVIRONMENT)	30	(23)	(20)
. Feeling unable to "get on" with some of the others at the station (SELF)	32	(19)	(15)
1983 (Before Departure) and (After Arrival) Sample			
. My employment prospects upon return to Australia (TASK)	(21)	(15)	26[a]
. Being the cause of a major accident (PHYSICAL ENVIRONMENT)	(20)	51	36
. Having to adjust to the extreme climate (PHYSICAL ENVIRONMENT	(8)	25	(8)

[a] N=39
[b] N=178

The Threat of Fire. Literature available to expeditioners, and the training undertaken before departure, emphasizes the threat of fire in the dry Antarctic climate. To some extent the response to this item may be learned, but Group Feedback discussion indicated apprehension on the part of some expeditioners regarding the impact of fire. Fire at Casey Station during 1982 destroyed the newly constructed power house, and so some expeditioners had had first-hand experience of fire.

The Absence of Women. Group Feedback discussion centred upon the topical issue of the presence of women at Antarctic stations with opinion divided as to whether that introduced additional, or simply different, difficulties. Comments indicated an acceptance that absence from women was a fact of Antarctic life, something with which expeditioners had to cope. The response rate to the item was a surprise, and contrasts with the attitude expressed in Group Feedback, suggesting that expeditioners were prepared to acknowledge an effect of the absence of women in the privacy of the questionnaire, but not in front of others.

Separation from my Family and Friends in Australia/Being Unable to Attend to Problems at Home. The first of these statements has been consistently rated as a major source of stress or pressure throughout the ASES questionnaire. In Group Feedback discussions with previous expeditioners the predominant problem reported was that of an inability to establish effective communication with family, particularly with regard to communicating emotion. Expeditioners spoke of the frustration of short phone calls involving unfinished conversations and in some cases unresolved conflict. For both the situations cited there is little direct action that the expeditioner can take to assist the coping process. Although some consciously

develop strategies to manage the conduct of radiophone calls, and the effects of separation, these can apparently be quite fragile, and are typefied by the comment, "you work hard, occupy yourself, and concentrate on other things ... it's worst at night". Others remarked upon the effect of a "bad" radiophone ("raddy") call; "You feel depressed for a day or so"; "It really affects the married blokes if they have a blue on a raddy, or if they think something's wrong at home". Mullin (1960), Palmai (1963), and Strange and Klein (1973), all referred to the effect of separation from family. Palmai placed more emphasis upon it than the other writers and his observations suggested that it may affect adjustment.

The six areas covered by these items seem to reflect more or less fixed elements of the station environment, that is, elements which the individual cannot really deal with by direct action. Fire drills, and the practise of preventative measures may increase individuals' confidence in their ability to cope, but the risk of fire remains, together with, for some, the apprehension associated with its possible incidence; similarly, the coping strategies mentioned by expeditoners in regard to separation, i.e., working hard, restricting radiophone calls, trying to put family out of their thoughts, deal with the effects of separation but cannot change the fact of separation. In terms of the transactional models of stress the primary perceived demand cannot be met, and this could be argued to create a constant imbalance, or cost, as defined by those models.

Differences between Samples

The most striking difference between the three samples is that between the 1980-82 (PE) sample (the "after" sample) and the 1983 samples (the "before" samples), on those items categorized as Social Environment. Although it is a qualitative interpretation, the direction of change in response rate indicates that elements of the Social Environment turned out to be a source of greater pressure than anticipated by expeditioners. The same direction is evident for "Feeling unable to 'get on' with some others at the station", which could also be argued to be an element of the social environment.

The effect of the social enviroment, specifically interpersonal relations, stimulated spirited comment and argument in Group Feedback sessions with the 1982 (PE) sample, and in fact for some, determined which of the two sessions they attended, or whether they attended at all.

Expeditioners spoke of an initial period after arrival when they were "careful" in their relations with others, but then, as one expeditioner put it, "gradually that superficial facade broke down and they shot from the hip". This has of course been observed previously (e.g., Law, 1960), but in the group in which the comment was made,

it was not unanimously accepted as a positive aspect of the social environment, and for some, pressure to conform to any dominant forms of behaviour was seen as an unwarranted invasion of privacy.

Expeditioners were not particularly forthcoming when queried on methods used for coping with the social environment, and that may not be unusual within a group discussion. One commented that "you reach a saturation point after about six months, you know who you can put up with and who you can't". Others attempted to ignore or avoid those individuals with whom they couldn't relate, but found this hard to do. Some felt that more emphasis could be placed on "human relations" training before departure, particularly in regard to conflict resolution, but others were wary of that approach.

In summing up the social environment, one expeditioner stated that "25 to 30 percent of people, although they won't put it down as a statement, quite honestly feel that not being able to communicate with others at times of pressure is a source of pressure".

In terms of general changes throughout the year, there was little support for having experienced a mid-winter "low" or drop in morale, and little concern regarding insomnia. The end of the year attracted comment with statements like: "worries seem to come when the ships are expected", "towards the end of it the guys are pretty jumpy", "you worry about finding out what's been happening at home". It is emphasized that these comments are drawn from a small group (N=7) of previous expeditoners from the 1983 sample, and from two groups (N=10, N=7) of 1982 expeditoners from one station.

Analyses of change between the 1983 (BD) and 1983 (AA) samples was conducted using repeated measures t-tests on the Macquarie Is. and Casey, Station samples. Only three statements showed significant change in rating, and these are shown in Table 21.

Table 21

ASES Section 4: Repeated Measures t-tests, 1983 (BD) with 1983 (AA) Samples

Item	1983 (BD) X	1983 (AA) X	t	df
. The planning by the Antarctic Division for my work area.	2.07	2.67	2.23*	29

Having to adjust to the extreme climate.	1.77	1.48	2.06*	30
. Lack of opportunity to be on my own.	1.65	2.06	2.14*	30

* .05>p>.01

On the basis of these results using a restricted population it could be argued that there is little evidence of the reality of having arrived on station having changed the expectation relating to wintering, although the direction of change for two of the items in Table 20 could be argued to be negative.

Differences within Samples on selected independent variables

All the items in Table 20 were subjected to chi-square analyses on the independent variables of Age, Occupational Status, Marital Status, and Previous ANARE experience. In Table 22, results are shown for those items and populations where a difference was found.

Marital Status. It is not surprising to find marital status contributing to differences on "Separation from my family and friends" or "Being unable to attend to problems at home", but the difference on "Feeling unable to 'get on' with some of the others at the station" is interesting, in that it is single expeditioners who experience more pressure. Owens (1975) found significant differences between married and single expeditioners on scales for overall performance, Value as a Member of Field Trip, and Behaviour Under Stress, with married men rated more negatively in each case. Unfortunately there is no outcome measure available in this study. Group Feedback discussion with previous expeditioners emphasized the difficulty that some married expeditoners have regarding separation, and this was discussed previously on p.65.
There was some support for the opinion reported by Owens (1975, p.52) that married men should not join an ANARE, but this was not based on task performance. Rather the observation by expeditioners was of short and long term emotional effects of separation, and of a year "lost" in family experience. Results suggest that replication of Owens' study would be worthwhile, and that further, a study directed at coping strategies may be of benefit to married expeditioners.

Occupational category. Results showing differences (for the 1980-82 (PE) samples only) related to occupational category are seen to be related to the actual task of the tradesmen on the stations, although this cannot be substantiated. Tradesmen are directly involved in the operation of plant and equipment, and in the construction of new buildings where it could be argued that the potential, for accident at least, is higher. If this interpretation

could be substantiated it would indicate a link between task, and physical environment, in the experience of stress.

Chi-square analyses revealed very few differences on the independent variables used, and perhaps it could have been expected that expeditioners who had participated in previous expeditions may have been distributed toward the lower ratings. The lack of differences found provides some support for the items rated by 25 percent or more of the samples as a source of moderate pressure or higher, being commonly experienced as sources of pressure.

Detailed consideration of items has confirmed a previous observation that the six sources of stress used as the basis for the generation of questionnaire items would be difficult to separate for a real setting. Additionally, because the writer has argued that the experience of stress involves the balancing of perceived ability against perceived demand, there must therefore be an element of the source Self, in every situation, and that cannot be assessed.

Nevertheless, the results as presented in Table 20 indicate situations additional to those reported by Mullin (1960), Palmai (1963), and Strange and Klein (1973) as being sources of stress in the station environment. Specifically, response to "The planning by the Antarctic Division for my work area" and "The importance of my job to the expedition" support an argument that Task may be more important in considering stress than previous studies on Antarctic populations have suggested.

Further support for the results presented in Table 20 is presented in the next Part of this chapter, which summarizes the responses to the open-ended question which concluded ASES Section 4.

Table 22

ASES Section 4: Chi-square Analyses of Selected Items on Age, Marital Status, Occupation Category, and Previous ANARE Experience

Independent Variable	Sample[a]	Item	X^2	df	Direction of Difference
Age	1980-82 (PE)	Nil			
	1983 (BD)	. Perhaps having to help sort out differences of opinion between expeditioners on the station	6.93*	2	Younger expeditioners distributed in direction of higher ratings. (Age distribution table had to be reduced to increase cell frequency; analysis reduced to under 30 vs. over 30)
Marital Status	1980-82 (PE)	. Separation from my family and friends	15.67**	4	Married expeditioners distributed in direction of higher rating.
		. Feeling unable to "get on" with some of the others at the station	9.81*	4	Non married expeditioners distributed in directicnof higher rating.
	1983 (BD)	. Separation from my family and friends	10.78**	2	Married expeditioners distributed in direction of higher rating.

Table 22 (cont)

Dependent Variable	Sample[a]	Item	X^2	df	Direction of Difference
Occupational Category	1980-82 (PE)	. Being the cause of a major	17.80*	8	Tradesmen distributed in direction of higher rating.
		. The threat of fire	27.43***	8	As above.
	1983(BD)	Nil			
Previous Appendence	1980-82 (PE)	Nil			
	1983(BD)	Nil			

a Frequency Tables for the 1983(AA) sample did not have sufficient numbers for Chi-square analysis, even when cells were combined.

* .05>p>.01
** p>.01
*** p>.001

Part Four: Additional Sources of Pressure Identified by Respondents; ASES Questionnaire and Group Feedback Sessions

Section 4 of the ASES questionnaire concluded by providing respondents with the opportunity to "...add (and rate) any areas that you consider should be included as sources of pressure, or stress, for expeditioners". The Group Feedback discussions also sought to elicit additional sources of pressure from expeditioners. The contributions made by expeditioners are reported in this Part.

A total of 305 additional sources of stress were contributed. This number presents an immediate challenge to the 36 items of the ASES questionnaire, or more positively, has the potential to enhance information obtained from those items.

In attempting to categorize statements into the six sources of stress used in the ASES questionnaire, surprisingly few new areas emerged. The number of statements which referred to the Antarctic Division as a source of stress seemed to warrant the separation of the Antarctic Division itself as a source of stress. A detailed summary of the 305 additional sources is shown in Appendices 10-11. Table 23 shows a summary, by source, for each sample.

Table 23

Additional Sources of Stress: Frequency by Category

Category	1980-82(PE)[a]	1983(BD)[b]	1983(AA)[c]
Task	9	3	2
Role	38	5	-
Behaviour Setting	93	16	2
Physical Environment	10	3	-
Social Environment	39	2	-
Self	7	1	-
Antarctic Division	59	10	6
TOTAL	255	40	10

[a]Contributed by 64% (N=115) of total respondents
[b]Contributed by 27% (N=24) of total respondents
[c]Contributed by 23% (N=10) of total respondents

The limited response from the 1983 (BD) and (AA) samples is probably due to the conditions under which the questionnaire was administered (see ch.4, p.41). In addition, the comments made in Group Feedback sessions regarding lack of knowledge of the environment, and suspicion of the use to which the responses would be put, may also have affected responses. An alternative explanation of course, is that the respondents did not foresee any additional sources of pressure.

Responses from the 1980-82 (PE) sample reflect Moser and Kalton's (1971, p.258) comment that mail questionnaires are more likely to attract "critical comments" and "less socially acceptable responses". The remainder of this part of the chapter concentrates on the responses from that population.

1980-1982 Previous Expeditioner Sample

Table 24 summarizes what are considered to be the major groupings of the additional sources of pressure contributed by the 1980-1982 (PE) sample.

With the exception of the additional statements referring to the Antarctic Division, none of the frequencies in Table 24 reach the criterion of 25 percent applied in the qualitative analysis of the formal items of Section 4 of the ASES questionnaire. Nevertheless, the mean rating, crude as it is, reflects a higher rating than that shown for the formal items, and the groupings are therefore of some interest.

Some comments can be made on the groupings drawing on Group Feedback discussions and the writer's own observations.

Leadership/Supervision. The majority of the statements refer to the OIC, but cover three years (and therefore 12 OICs), and are evenly distributed by year. The supervisory climate was the topic of some comment by previous expeditioners, but discussion was related to what is perceived as the confusing division of responsibility between foreman, OIC, and project supervisors in Australia.

Living Conditions/Amenities. Areas covered by contributions placed in this category would also be covered by what Herzberg termed "hygiene factors" (Scott, 1971). In Group Feedback discussion, both the After Arrival and a Previous Expeditioner group, attributed concern about conditions to a disappointment with the lack of scientific flavour of the expedition. "Everyone comes down thinking it's an expedition - everyone's willing to chip in, do a bit extra here, a bit extra there, but then comes the realization that it's a job, then it becomes a matter of pay, conditions, who works hard, who works less... it becomes just a job"; "This is a business, it's a construction camp, not an expedition... it would be of benefit if the science aspect of the station was obvious". Some felt that they had been poorly briefed, or stated that they had had difficulty finding out relevant information. A requirement seen by many expeditioners, was for more recreational space (indoors) so that some forms of intrusive entertainment could be avoided, (e.g., drinking, videos). This is interesting because of course, community entertainment has traditionally been seen as promoting group harmony and cohesion within such groups.

Communication with Australia. This has already been raised in previous discussion of results. In Group Feedback it was raised either as a criticism of the conditions of service - "it should be free", "Skeds should be longer" - but more often in relation to separation from family and friends.

Social Environment. The responses contributing to this category support the responses made to the formal items covering the same category, and previously discussed.

Table 24

1930-62 (PE) Sample: Groupings of Additional Sources of Stress by Category

Category	Mean[a] Rating	Frequency of mention
. Task[b]	-	-
. Role		
. Leadership/supervision	4.1	22(18)[f]
. Comment on having to work with inefficient/unsuitable expeditioners	3.6	13
. Behaviour Setting[c]		
Living conditions/amenities	4.0	33(27)[f]
. Communication with Australia (difficulties)	4.0	19(17)[f]
. Food/catering	3.3	14
. Physical Environment[b]	-	-
. Social Environment[d]		
. The behaviour of other expeditioners	3.5	37(31)[f]
. [illegible][b]	-	-
. Antarctic Division[e]		
. Lack of concern, interest by Head Office	3.7	13
. Supply/re-supply	3.4	11
. Supervision/Administration/ Management	3.9	30

[a] Rating: Scale from 1 (not a source of pressure) to 5 (source of extreme pressure)
[b] No single group of similar responses
[c] These groupings account for 71% of the additional contributions in this category
[d] These groupings account for 95% of the additional contributions in this category
[e] These groupings account for 91% of the additional contributions in this category
[f] The number of respondents who contributed the additional source, e.g. one respondent may have contributed two or more additional statements to the category.

Antarctic Division. Although the responses referring to the Antarctic Division have been divided into sub-categories in Table 24, in total figures, some 33 percent of the total number of respondents volunteered statements critical of the Antarctic Division. In previously discussing the response to the formal item regarding task planning by the Antarctic Division (p.104) it was suggested that the ASES questionnaire may be reflecting a general feeling of dissatisfaction with the Antarctic Division. This is evident in many of the statements made in response to the open-ended question. To what extent this results in an experience of stress is difficult to assess, although comments relating to lack of concern on the part of the Antarctic Division could be indicative of a feeling of isolation. Group Feedback and informal discussion reinforced the assessment of dissatisfaction, but nonetheless was often emotional and uncomplimentary.

Group Feedback Discussions

In presenting comments made by participants in Group Feedback discussions an effort has been made to use those comments which effectively illustrated a point of view on which there was some agreement. The observation by Mullin of a "complusive eagerness to communicate" (1960, p.323) was not quite so obvious, but certainly expeditioners talked willingly. However, as in any group situation, there were some who were present but who did not participate, and there were some who chose not to attend at all, and the loss of their opinions must be acknowledged. Individual interviews could overcome this but one researcher conducting interviews over, say, a two to three week period, would not be ideal.

As far as Group Feedback discussion was concerned, the 1980-82 (PE) sample was represented by the expeditioners at Casey Station, and a small group of previous expeditioners from the 1983 sample who formed one of the discussion sessions during Field Training. Groups from different stations may have expressed different views.

As a technique, Group Feedback did seem to encourage involvement in the study, although suspicion regarding the motives of the study were still being expressed by the 1983 Macquarie Is., expeditioners at the After Arrival discussion conducted by the previous year's MO. Using Heller's (1969) description, the data may be "soft" but they do permit a qualitative perspective for considering "hard" data. The writer is confident that participants were genuine in their participation in the discussions, but even though previous expeditioners were prepared to disclose more about themselves than groups from the 1983 samples, there was still a limit to how much they would, or could, disclose in a group situation.

Chapter 6

Discussion

As a preface to the discussion of results of this study, reference is made to the introductory chapter in which it was stated that expeditioners are selected for specialized occupations and for their likely ability to adapt to the Antarctic station environment. Two inferences may be drawn from this. First, because in part the selection procedure is based upon medical and psychological criteria, it could be argued that expeditioners should be more able to cope with the demands of the environment, and that this will affect their perception of the stressfulness of the environment. Second, the occupational history of expeditioners is predominantly data or equipment-oriented as opposed to people-oriented, with the consequence that some may have had little call to analyse inter-personal or intra-group relationships, or their own reactions, in a way which behavioural scientists take for granted. This may affect both their behaviour in the environment, and the ease with which they can report their behaviour.

It is argued that this study has identified several elements of living and working at an Antarctic station that expeditioners perceive as sources of pressure, yet somewhat paradoxically, there is no evidence that would suggest uniformly high levels of stress either in the Previous Expeditioner sample, or in the Before Departure or After Arrival samples, where the ASES questionnaire was complemented by the SACL.

In gross terms, this may mean either that the environment does not lead to the experience of stress, or that expeditioners are able to cope with whatever demands are placed upon them. Such a normative conclusion is useful in maintaining an overall perspective on the study, but it masks the experience of individual expeditioners, and as Gunderson (1963) suggested, the effect that individuals who experience stress may have on the group. For example, the fact that 48 percent of previous expeditioners rated "separation from my family and friends" as a source of moderate, or higher, pressure, suggests that expeditioners did experience a demand to cope with separation, and that it is a common demand.

Comparison with Other Studies

The sources of pressure identified from Section 4 of the ASES questionnaire, using arbitrary criteria, confirm to some extent the findings of previous studies (see Gunderson, 1963; Mullin, 1960; Palmai, 1963) but there are also some differences.

The Social Environment. In this study, Social Environment has been identified as a source of pressure by previous expeditioners. This is similar to previous studies which have found "the problem of individual adjustment to the group" to be a major source of stress.

Questionnaire items which related to Social Environment and which were identified in this study, were:

- Differences between the interests and activities of the expeditioners on the station.
- The feeling of having to change my behaviour to suit others.
- Having to cope with some of the "way out" social behaviour that occurred.
- Perhaps having to sort out differences of opinion between expeditioners on the station.
- The absence of women.

These were also supported by responses to the open-ended question at the conclusion of Section 4.

It is emphasized that for all these items there is an interaction between the individual expeditioner and the social environment, and trying to determine the relative balance between the demand of the environment and the ability of the individual must continue to be one of the difficulties facing studies of stress.

This study has provided additional information concerning Social Environment. It has been found, from a qualitative interpretation of the data, that expeditoners both before departure and immediately after arrival, do not perceive that the social environment will be a source of pressure to the extent perceived by previous expeditioners. The same before-after difference was also observed for "Feeling unable to 'get on' with some of the others at the station", which could also be argued to be related to the social environment.

Separation. Another similarity with previous studies lies in the consistent response, across samples, to the item "Separation from my family and friends in Australia". Palmai (1962) referred directly to this in noting marital relationships as a reason for expeditioners seeking counselling from the MO. Mullin (1960), in a psychoanalytic approach, identified absence of "usual sources of gratification" (including family) as increasing the burden of adaptation, but added that "Separation from home, wife, family and familiar situations of the man's personal 'civilization' was rarely a subject of any serious continuing preoccupation" (p.325). What is seen as a high rating on this item in this study, together with the significant difference found between married and single expeditioners and comments from Group Feedback discussions, suggests that separation can be a persisting source of pressure. Whether it becomes a preoccupation, affecting performance, cannot be concluded from this study, although evidence from Owens' (1975) studies, and from anecdotal sources, suggests that that can occur. Implications arising from the response to this item will be discussed at a later stage.

Task. Two items relating to the expeditioner's task have been identified as sources of pressure, for all samples, in this study, viz., "The planning by the Antarctic Division for my work area" and "The importance of my job to the expedition". Some previous studies (Palmai, 1963: Lugg, 1977) have referred to topics of conversation at stations, and whilst Task could be seen to be a major topic, it has not been cited as a source of stress, despite the evidence relating to task performance as a factor in adjustment. In the writer's opinion there is a perceived demand to demonstrate task ability to others, and for some, this demand is coupled with a responsibility arising from the reliance of others on their task ability. In furthering this argument, it would be interesting to know what level of task performance feedback occurs, but the implications of the response to task items appear to relate to selection, and task briefing.

Social Comparison

Whereas Palmai (1963), and Lugg (1977), concentrated on what expeditioners talked about, Natani and Shurley (1974) concentrated more upon how much time was spent in talking and argued (p.105) that groups in isolation may use conversation in a social comparison process which operates to reduce anxiety. In this study, an element of social comparison appears to have occurred in the responses to the task requiring expeditioners to rate themselves and others according to the frequency with which specified statements were, or were likely to be, a source of stress. Natani and Shurley based their argument on the studies of Schachter (1959), who, as reported in Teichman (1977) favoured self-evaluation (comparison) and anxiety-reduction explanations to explain affiliative behaviour in stressful situations.

No observations of affiliative behaviour or social interaction were made in this study, but the consistently significant differences between the ratings for Self and Others, and the fact that the differences were always in the same direction, suggests that a well-established comparative process was operating, but why are Others always rated as experiencing stress more frequently? Headey and Wearing (1981) found that respondents rated their own moral qualities more favourably than others', and noted that a "self-sustaining" attribute of rating one's self above average has been reported for several areas of behaviour (p.26). Two tentative suggestions are made based on those findings, and the results of this study.

First, if expeditioners have rated themselves above average[16], then there are several areas from

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[16] In this case it is reasonable to assume that the "above average" position is represented by the lower rating on the scale

amongst the 12 statements that they rated, for which the "average" that they attributed to Others is high (see Table 16). This leaves unanswered the question as to whether the Self, or Others, rating is the more accurate reflection of reality. Second, if as Headey and Wearing suggest, the process is self-sustaining, or as Natani and Shurley might suggest, it is anxiety-reducing, then it could be argued that perhaps a coping strategy utilized by expeditioners centres upon reducing (or denying?) their own experience of stress. Thus, by seeing the environment as placing higher demands on others, expeditioners compare themselves favourably with others, and evaluate their own position more favourably. How such a process of comparison affects behaviour remains unanswered.

Field studies by Radloff and Helmreich (1968), and Teichmann (1977), provided some evidence of affiliative behaviour being a means of individuals adjusting to a stressful situation. Teichmann studied soldiers in combat and found some support for his hypothesis that affiliative behaviour was motivated by a need for clarity and objective information, followed by a need for emotional support.

The results in this study were unexpected, and there is, at best, only a tenuous link with the social comparison and affiliative behaviour studies that have been referenced. However, it is suggested that they could provide direction to further research which concentrated either upon coping strategies, or perhaps the formation, through affiliation, of social groupings.

Agreement between Samples

Less of a surprise, but none the less interesting, is the high level of correlation found between the three samples on the task requiring expeditioners to rank 12 statements describing various aspects of the station environment. In so far as the samples represented before and after populations, it would appear that the expectations of expeditioners before departure and immediately after arrival, closely resemble the reality of the environment, as ranked by previous expeditoners. However, as the more detailed results from Section 4 of the ASES questionnaire have shown, the degree of pressure arising from the social environment is apparently not anticipated.

Is there any advantage in the apparent level of agreement? In the writer's opinion there is potential advantage for the pre-departure briefing or training process in that it would provide an agreed base for that process. It is suggested that knowing what to expect is necessary, but not sufficient, to knowing what to do. There is no evidence of a requirement for what might be called "group dynamic" training, but it is suggested that expeditioner training concentrate where possible on having station groups together in realistic (vis-a-vis the station situations, and that some formal training opportunity be provided for

expeditioners to discuss their expectations of the station environment.

The rank order of the statements also provides administrators with an insight into expeditioners' priorities, e.g., it can be argued that any matter related to the expeditioner's family, or to communication with the family, should be handled with speed and efficiency, and that expeditioners should be confident that that will happen.

Stress and Arousal

In the planning stages of this study the incorporation of a mood checklist was seen, naively, as a surrogate physiological measure. Certainly, it seemed reasonable to argue that it may be more easy to report an emotional experience than accurately appraise its source, as the proponents of the transactional models appear to assume. A similarity between mood and free-floating anxiety was considered possible, with a particular mood being experienced, but not necessarily associated, cognitively, with a specific situation.

The positive correlation between reponses on the ASES questionnaire and the Stress scale of the SACL does not resolve these questions, but could be interpreted as indicating an association between mood and cognitive appraisal at least on the measures used in this study.

The more interesting result from the three administrations of the SACL is the consistent difference between Stress and Arousal, and the significant increase in Arousal between first and second administrations. Unfortunately these results are limited to the Before Departure and After Arrival samples, but they support the findings by Mackay et al (1978), and King et al (1983), who have argued that there is an orthogonal relationship between Stress and Arousal.

The results are also comparable to those found by King et al for several "normal" Australian groups, including groups measured in what could be called stressful situations. In the writer's opinion the SACL may be open to a social desirability response style, particularly in this study where some expeditioners expressed a suspicion of the use to be made of the results. However, the comparability with previous investigations counters this argument to some extent.

What is the impact of continued high levels of arousal? Is there an attendant physiological cost which may affect the performance or health of some individuals? e.g. given the relatively dangerous unloading activity (ship to shore) that commences immediately upon arrival at a station, should "highly aroused" expeditioners be employed in areas requiring maximum adherence to safety procedures?

Given the range of scores for both scales on the SACL, is there any effect of individual differences on say interpersonal relations, or the social environment? From the viewpoint of the OIC, do high levels of arousal, rather than high levels of stress, suggest a need for a different style of management? These questions are obviously beyond the scope of this study, but do suggest directions for further research, both psychological and physiological, using perhaps an experimental allocation of expeditioners according to SACL scores, e.g., high stress/high arousal vs. low stress/high arousal etc., and wide-ranging performance or outcome measures.

Limitations of the Study

Limitations arising from the method used in the study, and the use of the Group Feedback discussions, were raised at the conclusion of Chapters 4, and 5, respectively. Further major limitations are seen to centre upon:

(a) the normative approach of the study;
(b) the negative orientation; and,
(c) the lack of outcome measures.

The normative approach. Whilst it is useful to be aware that, for example, 32 percent of previous expeditioners rated "Restrictions on personal privacy" as a source of moderate or higher pressure, and that there were no differences in that response on the independent variables of age, marital status, occupational category, or previous ANARE experience, the study does not provide insight into individual reactions, which could be expected to vary from individual to individual, and from time to time (Newman and Beehr, 1979, p.38). The normative approach therefore raises more questions than it answers.

The self-report approach at best probably provides no more than a global assessment of experience by individuals and whilst questionnaire items can be couched in cognitive terms, the complexity of the experience of stress as suggested by the transactional models is not satisfactorily addressed. Similarly, as neat and as helpful as McGrath's model is (Fig.3, p.15), it cannot represent the dynamic interaction of individuals and their environment, and if his interlocking circles were to represent stress phenomena realistically, they would have to include areas of varying size, and elastic boundaries.

The negative orientation. In trying to identify what is difficult in living and working at an Antarctic station, the study has ignored the satisfactions experienced in the environment. Marshall and Cooper (1978) for example, used both a pressure scale and a satisfaction scale in investigating executive stress. Although many expeditoners referred to the rewards of the environment, it is doubtful whether an argument that satisfactions balance stress could be sustained. Nevertheless, the study may be seen to be limited in its perspective.

The lack of outcome measures. In keeping with the preliminary nature of the study, and also to encourage expeditioner participation, there were no measures of performance sought or used. As a result the study has tended to rely upon descriptive and qualitative interpretation. Because the general thrust in "stress" studies is upon the performance, and well-being, of individuals, it will eventually be necessary for reliable and accepted outcome measures to be incorporated in future research. The writer would particularly favour research which investigated individual coping strategies, and the development of the social system, but understandably, organizational interest is likely to be directed toward both individual task performance and expedition goal achievement. In either direction, effective measures of performance may be difficult both to specify, and implement.

Implications of the Study

Some implications have already been drawn from the discussion thus far.

A positive aspect is simply that expeditioners were prepared to participate in a behavioural study. Several factors contributed to this, but if any were to be identified they would be: the applied orientation of the study; the observed (Mullin, 1960) willingness of previous expeditioners to talk about their experience coupled with a feeling by many Australian expeditioners that their experience is not heeded on return to Australia; and the facility that a Group Feedback approach provided for the participation of expeditioners and the identification of the researcher. The cooperation displayed by expeditioners is encouraging for future research.

It is necessary at this stage of the study to try to put the rather negative response of expeditioners to the Antarctic Division into perspective. Macpherson (1977) describes the attitude of expeditoners to the home organization as one of the "universal Antarctic problems", and states that "...in general, there exists a level of cynicism regarding the hierachy which, under more normal working conditions, would surely precipitate a breakdown in industrial relations." (p.582). He sees the problem as one of divergent social systems, and seems to accept the status quo in his statement, "it is doubtful if it could be overcome" (p.583). Natani and Shurley (1974) are perhaps less sympathetic to the "management" position, and more optimistic about the possibility of change. They argue inter alia, that "unimaginative administration" can lead to negative attitudes, and that the home organization in its management of expeditioners, must take account of the social system and the dependent status of the isolated groups that it administers. (see p.110).

The Antarctic Division obviously serves a useful purpose as an external-to-the group butt of complaint, but responses, written and verbal, suggest that for some individuals at least, the negative attitude toward the Antarctic Division is counter-productive, whilst for others, the perceived attitude of the Antarctic Division is a source of pressure. To accept the status quo, as suggested by Macpherson (1977), ignores the advantage and challenge inherent in seeking the achievement of positive change.

Results from the study tend to confirm the emphases existing in the current selection procedures, although as already suggested, the failure to utilize outcome measures is a limitation. To be realistic, the conclusion that married expeditioners find separation from family to be a source of greater pressure than that for single expeditioners, is most unlikely to ever lead to a recommendation that married applicants not be employed. There are however implications that could be seen for interviewing psychologists, in probing marital stability, potential compassionate circumstances, and emotional dependence, and for the Antarctic Division in the degree of briefing material provided for applicants, in the training of expeditioners, and in the administration of communication facilities. The latter area could well be the subject of further research. It is one in which expeditioners have a real interest, and in which existing coping strategies appear to rely on the suppression of emotion, leading to, for example, confusion about the best way to use the radiophone facility.

The difference found between married and single expeditions on separation from family, and the item "Feeling unable to "get on" with some members of the expedition" raises the hoary question of group composition, a question that is now also confounded by the more frequent employment of female expeditioners with ANARE. The pursuit of further research in this area would be worthwhile, particularly for the management of stations.

Conclusion

In the first instance, this study has done no more than identify areas which Australian expeditioners report as sources of pressure. On a qualitative basis, and using a broad before/after design, a level of agreement between expeditioners before departure, immediately after arrival, and after the experience of wintering has been found, except in the area categorized as Social Environment. In meeting the "preliminary" aim of the study, the findings of previous "stress" studies have been largely confirmed, although an aspect of Task or perhaps Role, ("The importance of my job to the expedition"), and the perceived attitude of the home organization, have been identified in addition to factors relating to separation from home, and the Social Environment.

The frequency with which stress is experienced, and its effect on either performance, health, or inter-personal and group relations has not been addressed and this is a limitation of the study. From Group Feedback discussion it is apparent that most expeditioners cope most of the time, however, the level of response obtained on some items suggests that expeditioners perceived a demand to cope, lending support both to the assumption that the environment can be stressful, and to the need for selection.

Several implications for selection, training, and administration have been drawn, some of which would benefit from either further discussion or research. From the point of view of further research, the most interesting and relevant areas appear to be:

(a) The continued investigation of Stress and Arousal, perhaps incorporating physiological measures, and using shorter observation periods (e.g., monthly intervals) throughout the expedition experience. In particular the relationship between arousal and performance appears to be at least as promising for investigation as the relationship between stress and performance.

(b) Further investigation of the apparent comparative process operating where expeditioners consistently rated Self more favourably than Others.

(c) Development of a longitudinal research design that can be used to investigate the frequency with which stress is experienced, and the strategies which expeditioners employ to cope with that experience.

(d) Development of performance and outcome measures which could be incorporated in behavioural research.

The Antarctic station has been described as life in a test tube, and a natural laboratory for behavioural research. Perhaps it is, but regrettably there is not a tradition of behavioural research associated with Australia's Antarctic programme, and since the early ground work of Lugg (1974), Owens (1975), and Palmai (1963) forays into the field have been piecemeal. In suggesting that there should be co-ordinated behavioural science programme, the writer would argue that such a programme should be orientated toward practical or "applied" research. The need for such a programme should be discussed between the administrators of expeditioners, behavioural scientists, and indeed, expeditioners themselves.

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APPENDIX 1

CONSTRUCTION OF THE ANARE STATION ENVIRONMENT STUDY (ASES) QUESTIONNAIRE

General Approach

The varied occupational and cultural background of expeditioners, together with the perceived resistance to behavioural studies, dictated the need for a straight-forward, concise questionnaire that would appear relevant to the respondents.

The Introduction

Apart from the general information designed to identify the researcher and the broad aims of the study, the Introduction provided an introduction to the concept of stress, and attempted to overcome any initial resistance to admitting to having experienced stress.

Section 1: Biographical Information

Biographical information was kept to a minimum consistent with the need to determine the characteristics of the sample in relation to the total expeditioner population and with the opportunity to test independent variables which may have an influence upon individual experiences of stress.

Because the 1983 expeditioners had to complete the ASES questionnaire on repeated occasions, individual identification (by number) was incorporated into their questionnaire. As an extension of this study, expeditioners will further complete the questionnaires at mid-year, and at the end of their expedition year.

Section 2: Rank 12 Statements Attributed to Previous Expeditioners

This Section listed 12 statements gained from interviews with previous expeditioners and presented as sources of stress for those expeditioners. Respondents were asked to rank the 12 statements (from 1-12) according to "how stressful you consider that they would have been for those previous expeditioners." The Section was aimed at further overcoming resistance to admitting to stress by stating positively that previous expeditioners have experienced stress, and preceded questions directed at the respondents' own experience.

The 12 statements were selected such that the six sources of stress from the McGrath model were covered by two statements, as follows:

Task

. Responsibility associated with the station being dependent upon their specific skill.

. Insufficient work experience.

Role

. Being expected to assist with tasks other than those for which they were employed.

. Being supervised by an individual with limited or no knowledge of their particular field or trade.

Behaviour Setting

. Lack of privacy

. Boredom.

Physical Environment

. Risk of injury or death.

. Being restricted to the general area of the station for most of the year.

Social Setting

. Living and working with the same small group of people.

. Pressure to conform to the wishes of the majority.

Self

. Separation from immediate family and friends.

. Inability to "get on" with some members of the expedition.

Section 3: Rate the 12 Statements for Self and Others

Using a 3-point scale, respondents were asked to rate the 12 statements used in Section Two in relation to themselves ("how stressful...for yourself") and to Others. The Section introduced the need to link the rating task to the specific respondent population e.g.:

1980-82 (Previous Expeditioners): how stressful ... firstly for yourself, and secondly for the other expeditioners with whom you wintered.

1983 (Before Departure) and (After Arrival): how stressful ... firstly for yourself, and secondly for the other expeditioners that have been selected for service with ANARE in 1983.

In this manner, Section 3 attempted to shift the emphasis of the questionnaire to the respondents' own experience. At the same time, it provided a basis for investigating whether the respondents' experience of stress related to what they perceived to be the experience for others, as expressed by the rank order applied to the 12 statements in Section 2.

A direct comparison between individual respondents and their peers is also possible from the Self and Others ratings. There was an expectation that a difference could exist, but no direction of difference was hypothesized. The Section also provides the opportunity to assess change from the Before Departure to the After Arrival situation. Again, no direction of change was hypothesized for each statement.

Section 4: Rate 36 items relating to aspects of living and working in Antarctica

This Section presented the respondent with 36 items to be rated on a 5 point scale ranging from 1 - not a source of pressure at all, through to 5 - an extreme source of pressure. For the 1983 expeditioners the word "likely" was inserted, e.g. 5 - likely to be an extreme source of pressure.

The scale is similar to that used by Marshall and Cooper (1978), and the definition of "pressure" is the same as that used by those writers (p.136). "Pressure" is seen as a more socially acceptable word than "stress"; it is used as a synonym for stress in this study, and that is consistent with the general usage reported by Hutton (1981). The switch from the use of the word "stress" in Sections 2 and 3, to "pressure" in this Section, is perhaps inconsistent.

Item Selection. Items were generated from three sources and took into account the six classes of stress inherent in the McGrath model. The three sources were:

(a) items used in similar questionnaires presented in Robinson, Athanasiou, and Head (1966);
(b) items which have arisen in interviews with previous expeditioners, and which are already reflected in Sections 2 and 3 of the questionnaire; and
(c) items generated by the writer.

Six items were chosen for each McGrath source of stress. This was seen as necessary to comprehensively cover each area whilst keeping the length of the Section to

a minimum. Against the criteria laid down by Nunnally (1967; pp.257 and 260) the number of items could have been fewer.

Because the groupings of items were not considered to be apparent, they were not distributed randomly throughout the questionnaire. Further, the aim of simplicity of comprehension was balanced against the need to avoid the response set referred to by Moser and Kalton (1971; p. 362) and the decision made was to maintain the same direction in both items and ratings.

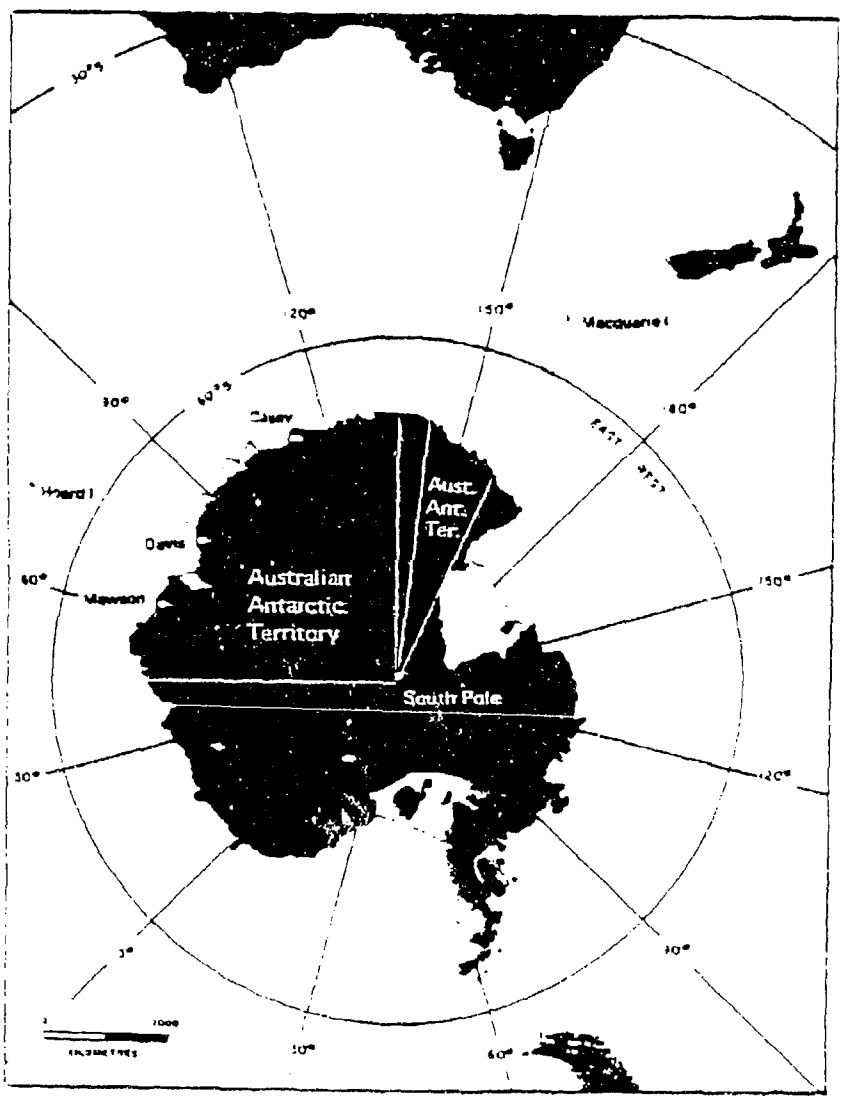
An open-ended question was added at the conclusion of Section 4, giving respondents the opportunity to add, and rate, any areas that they thought should have been included.

The questionnaire was named the Antarctic Station Environment Study (ASES) with the idea of introducing an overall raison d'etre for behavioural research at Antarctic Stations, and of avoiding direct reference to "stress".

ANARE

STATION ENVIRONMENT STUDY

QUESTIONNAIRE C



INTRODUCTION

In today's society, factors such as the increasing use of technology, rapid communication, changing work and social values, and increasing unemployment, are seen as increasing the "pressure of living" and consequently as placing individuals under some degree of stress.

For the individual, stress may mean feelings of concern or worry, feelings of being under pressure or perhaps of being unable to cope, or feeling physically unwell.

A substantial amount of research by doctors, psychologists, and sociologists has concentrated upon stress at work, and has looked at both the causes and effects of stress. Some occupations have been assumed to be stressful by the very nature of either the duties involved, the location of the job, or a combination of both. Examples of these occupations are, astronauts, soldiers in combat, divers involved in underwater living experiments and not surprisingly, Antarctic expeditioners.

Very few studies have attempted to find out systematically what it is that makes these occupations stressful for the individuals involved. This questionnaire forms part of a preliminary investigation into the sources of stress for expeditioners serving with the Australian National Antarctic Research Expedition (ANARE).

The Antarctic Division, by sponsoring studies of this nature, aims to use the experience of expeditioners to update existing knowledge about reactions to living on ANARE stations, and to review selection, training and administration policies.

The study is being conducted by LTCOL John Godwin of the Australian Army Psychology Corps. This questionnaire is to be administered to 1983 expeditioners at several points during their ANARE employment, and by mail, to expeditioners who served with ANARE from 1979 - 1981.

Thank you for your help

SECTION 1

This section asks for some personal details. Individual identification is not required for the study, and no attempt to identify individuals will be made.

Instructions

Please answer each question by ticking (✓) the box alongside the answer that applies to you.

1. Age: (as at January of your most recent expedition year)

- 21 - 25 ☐
- 26 - 30 ☐
- 31 - 35 ☐
- 36 - 40 ☐
- 41 - 45 ☐
- 46+ ☐

2. Sex: Male ☐ Female ☐

3. Marital Status: (as at January of your most recent expedition year)

- Not Married ☐
- Married ☐
  (including living in defacto relationships)

4. Age group and number of dependent children living with you immediately prior to your most recent expedition year.

Age Group/Number

eg. If you had 1 child at preschool, and 2 at primary school, you would record this as
Preschool 1
Primary School 2

- Preschool ☐
- Primary School ☐
- Secondary School ☐
- Tertiary Student ☐
- Employed ☐
- Unemployed ☐

5. Station:

- Casey ☐
- Davis ☐
- Macquarie Is ☐
- Mawson ☐

6. Occupational Category on station

- Scientist ☐ including MO
- Tradesman ☐
- Semi-professional ☐ includes OIC, Met Obs, radio tech, radio op.

7. Had you "wintered" before?

- Yes ☐
- No ☐

Turn to Section 2

SECTION 2

Discussion with some of the expeditioners who have wintered at an Australian Antarctic station during the years 1979-81, has indicated several areas which they have seen as sources of stress, either for themselves or others.

Twelve of these areas are listed below. On the basis of your own feelings, rank the areas from 1 to 12 according to how much you think they could have been stressful, for those previous expeditioners. eg., if you think "boredom" would have been their most likely source of stress, put the number 1 in the box alongside of "boredom", and then rank all the other areas through to 12, thus 12 would be the area that you think would have been their least likely source of stress.

READ THROUGH THE AREAS BEFORE STARTING

Area	Rank
. Lack of Privacy.	
. Responsibility associated with the station being dependent upon their specific occupational skill.	
. Separation from immediate family and friends.	
. Risk of injury or death.	
. Living and working with the same small group of people.	
. Insufficient work experience.	
. Boredom.	
. Inability to "get on" with some members of the expedition.	
. Being expected to assist with tasks other than those for which they were employed.	
. Pressure to conform to the wishes of the majority.	
. Being restricted to the general area of the station for most of the year.	
. Being supervised by an individual with limited or no knowledge of their particular field or trade.	

Turn to Section 3

SECTION 3

Instructions

The areas that you have just ranked are those that some previous expeditioners have felt to be stressful. Obviously people differ from each other and the experiences of previous expeditioners may not apply to you.

Consider each area that you have just ranked in terms of how stressful it was, firstly for yourself, and secondly, for the other expeditioners with whom you wintered.

Use the following code and circle the number of the answer that best describes your feelings.

Not a source of stress at all	1
An occasional source of stress	2
A frequent source of stress	3

Area	Self	Others
. Lack of privacy	1 2 3	1 2 3
. Responsibility associated with the station being dependent upon your particular skill.	1 2 3	1 2 3
. Separation from immediate family and friends	1 2 3	1 2 3
. Risk of injury or death.	1 2 3	1 2 3
. Living and working with the same small group of people.	1 2 3	1 2 3
. Insufficient work experience.	1 2 3	1 2 3
. Boredom	1 2 3	1 2 3
. Inability to "get on" with some members of the expedition.	1 2 3	1 2 3
. Being expected to assist with tasks other than those for which you are employed.	1 2 3	1 2 3
. Pressure to conform to the wishes of the majority.	1 2 3	1 2 3
. Being restricted to the general area of the station for most of the year.	1 2 3	1 2 3
. Being supervised by an individual with limited or no knowledge of your particular field or trade.	1 2 3	1 2 3

Turn to Section 4

SECTION 4

Instructions

The statements in this section relate to some aspects of living and working in Antarctica. Please read each statement, and decide how much it represented a source of pressure for you.

Use the following code, and circle the number that corresponds to the answer that you want to make.

Not a source of pressure at all		1
A source of	(slight pressure	2
	(moderate pressure	3
	(considerable pressure	4
	(extreme pressure	5

eg, if a statement represented a source of slight pressure for you, you would circle the number 2 alongside the statement.

Definition

Pressure = something that worried or concerned you, something that you had difficulty coping with, a problem.

1.	The level of work ability required to do the job.	1 2 3 4 5
2.	The planning by the Antarctic Division for my work area.	1 2 3 4 5
3.	Lack of control over my pay and allowances.	1 2 3 4 5
4.	The relevance of pre-expedition training to on-the-job requirements.	1 2 3 4 5
5.	My employment prospects upon return to Australia.	1 2 3 4 5
6.	The importance of my job to the expedition.	1 2 3 4 5
7.	Being unclear about the precise duties of my job.	1 2 3 4 5
8.	The extent to which I had to help others with their jobs.	1 2 3 4 5

Not a source of pressure at all		1
A source of	(slight pressure	2
	(moderate pressure	3
	(considerable pressure	4
	(extreme pressure	5

9.	The amount of work supervision that was applied.	1 2 3 4 5
10.	Having to keep to rules and regulations.	1 2 3 4 5
11.	My immediate supervisor.	1 2 3 4 5
12.	A feeling that some jobs were easier than others.	1 2 3 4 5
13.	The lack of back-up skill for some jobs on the station.	1 2 3 4 5
14.	Restrictions on personal privacy.	1 2 3 4 5
15.	Being bored.	1 2 3 4 5
16.	Being so isolated from Australia and other stations.	1 2 3 4 5
17.	Not being able to leave the job if I didn't like it.	1 2 3 4 5
18.	Being the cause of a major accident.	1 2 3 4 5
19.	Having to adjust to the extreme climate.	1 2 3 4 5
20.	The threat of fire.	1 2 3 4 5
21.	A feeling that my life was exposed to danger.	1 2 3 4 5
22.	Having to participate in field trips.	1 2 3 4 5
23.	Being generally restricted to the immediate vicinity of the station.	1 2 3 4 5
24.	The need to adapt my work skills and experience to the conditions imposed by the climate.	1 2 3 4 5
25.	Differences between the interests and activities of the expeditioners on the station.	1 2 3 4 5
26.	The feeling of having to change my behaviour to suit others.	1 2 3 4 5

Not a source of pressure at all		1
A source of	(slight pressure	2
	(moderate pressure	3
	(considerable pressure	4
	(extreme pressure	5

27.	Having to cope with some of the "way out" social behaviour that occurred.	1 2 3 4 5
28.	Lack of opportunity to be on my own.	1 2 3 4 5
29.	Perhaps having to help sort out differences of opinion between expeditioners on the station.	1 2 3 4 5
30.	The absence of women.	1 2 3 4 5
31.	Separation from my family and friends in Australia.	1 2 3 4 5
32.	Feeling unable to "get on" with some of the others at the station.	1 2 3 4 5
33.	Feeling that I may not have been liked and accepted by other expeditioners.	1 2 3 4 5
34.	Being unable to attend to problems at home.	1 2 3 4 5
35.	Whether I had made the right decision in joining ANARE.	1 2 3 4 5
36.	My level of physical fitness.	1 2 3 4 5

In the space provided below, add (and rate) any areas that you consider should be included as sources of pressure, or stress, for expeditioners.

.....	1 2 3 4 5
.....	1 2 3 4 5
.....	1 2 3 4 5
.....	1 2 3 4 5
.....	1 2 3 4 5

Turn to Section 5

SECTION 5

The following reasons have frequently been given as reasons for applying to joining an ANARE. Please indicate the degree to which the reason applied to you by circling the appropriate number on the scale.

Not a reason for my application	1
Contributed slightly to my application	2
Contributed moderately to my application	3
Contributed considerably to my application	4
The major reason for my application	5

Reason

. Adventure	1 2 3 4 5
. Job experience/career advancement	1 2 3 4 5
. Money	1 2 3 4 5
. Opportunity to get away from problems in Australia	1 2 3 4 5
. The appeal of the environment	1 2 3 4 5
Any other reasons that you may have had	
.....	1 2 3 4 5
.....	1 2 3 4 5
.....	1 2 3 4 5
.....	1 2 3 4 5

Thank you for your co-operation.

APPENDIX 3

SELECTION OF THE STRESS-AROUSAL CHECK LIST (SACL)

The requirement in selecting a developed stress questionnaire was to provide an instrument complementary to the ASES questionnaire. It was considered that the questionnaire had to be short, easily understood, not easily manipulated, appear relevant to the station environment and be supported by evidence that it may be able to measure stress in that environment.

Questionnaires based on the life-events approach to stress measurement (Christensen, 1980) were rejected as inappropriate to this particular study. Several promising leads from Ki-Taek, Cobb, and French (1975) were followed, viz., the Stressful Situations Questionnaire (Hodges and Felling, 1970), the Job Related Tension Index (Lichtman, 1970) and the Autonomic Perception questionnaire (Lazarus and Opton, 1967), but none satisfied all criteria.

The Cornell Medical Index (Seymour, 1976) developed on a population of 1046 US Antarctic personnel was rejected because of its 195-item length, whilst the Victoria Isolation Scale (Taylor, 1976) was rejected on advice[17] that it had been found to be more sensitive in the laboratory than in the field.

The process of reviewing questionnaires led to the conclusion that a simple mood adjective check list, devoid of life events, medical ailments and somatic symptoms would best meet the criteria. The Stress-Arousal Check List (SACL) was chosen from four scales, of which the other three were the Multiple Affect Adjective Check List, the State-Trait Anxiety Inventory, and the Profile of Mood States.

The SACL was developed by Mackay, Cox, Burrows, and Lazzerini (1978). The original 36-item checklist has been shortened and used successfully on Australian populations by King, Burrows, and Stanley (1983), in a 20-item format.

Based on factor analytic development, the SACL makes a distinction between stress and arousal. Mackay et al (1978) argued that the two factors are othogonal, and this has been supported by King et al (1983), and King, Cornwell, Stanley, and Burrows (1983). Studies conducted with the full version of the SACL in the UK (Burrows et al, 1977: Cox, Mackay, and Page, 197), and with the shortened version in Australia (King et al, 1983; King, Cornwell et al, 1983) have shown the instrument to be sensitive to change in different situations.

---

[17] Personal communication, Professor A.J.W.Taylor, June 1982.

The SACL was easily administered and understood, took less than 10 minutes to complete, and was considered to be non-threatening to respondents. It was presented to respondents as a Mood Adjective Check List in order to avoid reference to "stress" and "arousal", and this was as it was used by Mackay et al (1978).

APPENDIX 4

ANARE STATION ENVIRONMENT STUDY
MOOD ADJECTIVE CHECKLIST

Name/Ident No.....

Instructions

Each of the following words describe feelings or moods. Please use the list to describe your feelings during the last week.

If the word definitely describes how you have felt during the last week, circle the double plus (++) to the right of the word. For example, if the word is RELAXED and you have definitely felt relaxed during the last week circle the double plus as follows:

RELAXED (++) + ? -

If the word only slightly applies to your feelings during the last week, circ the single plus (+) as follows:

RELAXED ++ (+) ? -

If the word is not clear to you, or you cannot decide whether or not it appli to your feelings during the last week circle the question mark as follows:

RELAXED ++ + (?) -

If you clearly decide the word does not apply to your feelings during the las week, circle the minus (-) as follows:

RELAXED ++ + ? (-)

First reactions are usually the most reliable, therefore do not spend too long considering each word. However, try to be as accurate as possible.

AROUSED	++	+	?	-	ACTIVE	++	+	?	-
DROWSY	++	+	?	-	BOTHERED	++	+	?	-
DISTRESSED	++	+	?	-	PASSIVE	++	+	?	-
TENSE	++	+	?	-	ENERGETIC	++	+	?	-
ALERT	++	+	?	-	CALM	++	+	?	-
UP-TIGHT	++	+	?	-	CONTENTED	++	+	?	-
SLEEPY	++	+	?	-	WORRIED	++	+	?	-
LIVELY	++	+	?	-	TIRED	++	+	?	-
COMFORTABLE	++	+	?	-	UNEASY	++	+	?	-
VIGOROUS	++	+	?	-	RELAXED	++	+	?	-

AUSTRALIAN ARMY

From: LTCOL John Godwin

Telephone 697 4292

c/- DIST PSYCH OFFR 3MD
HEADQUARTERS 3rd MILITARY DISTRICT
Victoria Barracks
St Kilda Road
MELBOURNE VIC 3004

In reply please quote

21 Oct 82

Dear _____

I am writing to you to ask your co-operation in completing a questionnaire which relates to aspects of living and working at an Australian National Antarctic Research Expedition (ANARE) station.

For the period 1979-1981, in the position of District Psychology Officer, Headquarters 3rd Military District, I was directly involved in liaison with the Antarctic Division concerning the assessment of applicants for ANARE. The period included a visit, during the 1980/81 summer re-supply to Casey and Davis Stations.

I am currently undertaking a Master of Applied Psychology at the University of Melbourne. The questionnaire forms part of the research thesis requirement for that course, but has the broader aim of providing information that is relevant to the selection, training, and administration of expeditioners.

The questionnaire is to be administered to all 1983 expenditioners before they depart, and on three occasions during their expedition year. It is also to be forwarded by mail to expeditioners who served in the 1980-1982 expedition years.

Completed questionnaires will be held at the above address and destroyed after statistical information has been recorded. There is no requirement for you to identify yourself, and no attempt at identification will be made from the personal information that is required.

The experience of previous expeditioners will be particularly valuable to the study and your co-operation in completing the enclosed questionnaire and returning it in the envelope provided would be sincerely appreciated. Please feel free to include any comments that you wish to make. If you do not wish to participate simply return the questionnaire. The questionnaire is not subject to copyright or other restrictions, but I would prefer that it not be distributed outside of those participating in the study.

Thanking you in anticipation.

Yours sincerely

John Godwin

Enclosures: 1. Questionnaire (1980-82 Expeditioners)

2. Reply paid envelope

APPENDIX 6

AUSTRALIAN ARMY

From: LTCOL John Godwin

Telephone 697 4292

c/- DIST PSYCH OFFR
HEADQUARTERS 3rd MILITARY DISTRICT
Victoria Barracks
St Kilda Road
MELBOURNE VIC 3004

In reply please quote

16 Feb 83

Dear ——

In October 1982 I forwarded a questionnaire to all 1980 and 1981 ANARE expenditioners, with the exception of those individuals who are wintering again in 1983. The purpose of this letter is two-fold, firstly to sincerely thank those who responded, and secondly, to gently prod the memories of those who put the questionnaire aside for a rainy day and are still waiting for the drought to break.

Your may be interested in the response rate to the questionnaire:

Number despatched	160	
Number answered	96	(60%)
Number returned blank	1	
Number returned (address unknown)	32	(20%)
Number outstanding	31	(20%)

The excellent response, together with the number of constructive suggestions is obviously most encouraging, but more importantly I think emphasizes the amount of experience amongst previous expeditioners that is going begging.

To the numerous individuals who attached personal notes - thank you - time prevents a more personal reply than this. I do plan to forward a condensed and readable edition of my thesis to all expenditioners from the 1980 - 83 years, and that should be in about twelve months from now.

Once again, thank you for your co-operation, and if your memory has faltered, it is not too late.....

Yours sincerely,

John Godwin

NOTE: This is the text of the letter sent to expeditioners. A subsequent check of figures revealed that a total of 170 questionnaires had been mailed (see Table 5, p.17). Subsequent action to trace 'address unknown' expeditioners reduced the figure of 20% to 15%.

APPENDIX 7

Response Rate by Station and Year: 1980-82 Previous Expeditioners

	Casey			Davis			Mawson			Macquarie Island			Total		
	Total	Sample	%	Total	Sample	%	Total	Sample	%	Total	Sample	%	Total	Sample	%
1980	24	16	67	21	14	67	26	16	62	19	7	37	90	53	59
1981	27	18	67	23	16	70	30	15	50	17	8	47	96	57	59
1982	33	32	97	23	12	52	31	13	42	18	12	67	105	69	66
Total	84	66	79	67	42	63	87	44	51	54	27	51	291	179	62

APPENDIX 8

DISTRIBUTION OF AGE, OCCUPATIONAL CATEGORY, MARITAL STATUS AND PREVIOUS ANARE EXPERIENCE FOR PARENT (P) AND SAMPLE (S) POPULATIONS

Age

Age Group Year		21-25	26-30	31-35	36-40	41-45	46+
1980-82	(P)	61	88	67	37	16	15
	(S)	29	61	38	28	13	10
1983	(S)	27	21	17	10	9	5

Occupational Category

		Scientist	Tradesman	Other Support Staff
1980-82	(P)	50	133	101
	(S)	38	75	66
1983	(S)	15	41	33

Marital Status

		Not Married	Married
1980-82	(P)	177	107
	(S)	95	84
1983	(S)	52	37

Previous ANARE Experience

		"Wintered" previously	No previous experience
1980-82	(P)	68	216
	(S)	42	137
1983	(S)	25	64

APPENDIX 9

Rank Order of 12 Statements based on Mean Rating (3-point scale) of How Stressful for Self and Others

Statement	Rank Order					
	1980-82(PE) N=179		1983 (BD) N=79		1983 (AA) N=40	
	Self	Others	Self	Others	Self	Others
Separation from immediate family and friends	1	1	1	1	1	1
Lack of privacy	2.5	3	2	3	5	6
Inability to "get on" with some members of the expedition	2.5	2	7	4	3.5	5
Living and working with the same small group of people	4	4	4	6	10	7
Being restricted to the general area of the station for most of the year.	5	7	3	5	7	2
Pressure to conform to the wishes of the majority	6	8	9	8	9	8
Being supervised by an individual with limited or no knowledge of your particular field or trade	7	6	10	7	2	3.5
Boredom	8	5	6	2	11	10.5
Responsibility associated with the station being dependent upon your specific occupational skill	9	9	5	9.5	3.5	3.5
Risk of injury or death	10.5	12	8	9.5	6	9
Insufficient work experience	10.5	11	11	11	8	10.5
Being expected to assist with tasks other than those for which you are employed.	12	10	12	12	12	12

APPENDIX 10

1980-1982 PREVIOUS EXPEDITIONER SAMPLE

ADDITIONAL SOURCES OF PRESSURE IDENTIFIED BY EXPEDITIONERS

The sources of pressure included in this Appendix were provided by the 1980-82 expeditioners in response to the request to '...add (and rate) any areas that you think should be included as sources of pressure, or stress, for expeditioners'.

Responses are recorded as written by the expeditioners, with examples given for summarized responses. The rating is that used by expeditioners, from 1 (not a source of pressure at all) through to 5 (a source of extreme pressure). Where the wording of statements was the same, a frequency and mean rating is shown.

Task

Serial	Additional Source of Pressure	Mean Rating	Frequency
(1)	(2)	(3)	(4)
Statements which considered the Antarctic Division as a source of pressure			
1.	Perceived lack of concern from the Antarctic Division e.g. "Feeling lack of interest by Head Office" "ANARE's attitude to expeditioners once on ice" "Lack of Head Office concern"	3.7	13

(1)	(2)	(3)	(4)
2.	Supervision e.g. "Excessive ANARE control of small things" "HQ ignoring recommendations" "Lack of understanding by HQ staff and problems in being understood"	3.8	12
3.	Administration e.g. "Lack of briefing by ANARE on certain domestic policies" "Lack of quick and reliable information" "Lack of accurate pre-departure briefing"	3.8	10
4.	Management/policy e.g. "Lack of instruction as to the year's aims and goals" "Lack of definite policy direction" "Lack of on-going coordination from year to year and adequate de-briefing"	4.3	8
5.	Supply/Re-supply Statements referring to deficiences in supply/re-supply of equipment, clothing, and food e.g. "Being sent the wrong things" "Insufficient replacement clothing" "Availability of material for my job"	3.4	11
6.	Training "Total failure of aid to build any sense of team" "Inadequate training as a group"	4	2
7.	Miscellaneous "Waste of money by ANARE" "The length of the stint" "The station and the Antarctic Division has overrated the place"	2 4 3	1 1 1
	SUB TOTAL		59
Other sources of pressure related to Task			
8.	Difficulties associated with shift work e.g. "Due to shift work, no time to get away" "Lack of equal rights between support staff and shift workers"	3.8	4
9.	"Lack of skilled assistance"	4	1

(1)	(2)	(3)	(4)
10.	"Being undermanned"	3	1
11.	"Change to construction camp"	5	1
12.	"Will my research be fruitful"	5	1
13.	"Hardship for traverse personnel"	4	1
	SUB TOTAL	4.0	9
	TOTAL	3.8	68

Role

Serial	Additional Source of Pressure	Mean Rating	Frequency
(1)	(2)	(3)	(4)
1.	Leadership/Supervision Statements which relate to the style of leadership or supervision e.g. "Being placed under the change of unreasonable expedition leaders" "OIC's leadership style" "Being unable to convince the OIC of the important of my task"	4.1	22
2.	Respondent's task made more difficult by perceived unsuitability, and inefficiency of other expeditioners e.g. "Inefficiency in other expeditioners" "Expeditioners disinterested in job, totally incompetent" "Poor and inadequate selection methods (unsuitable people)" "Depending and working with unsuitable expeditioners"	3.6	13
3.	"Others not "pulling their weight"	3.3	3
	TOTAL	3.7	38

Behaviour Setting

Serial (1)	Additional Source of Pressure (2)	Mean Rating (3)	Frequency (4)
1.	General statements relating to living facilities/amenities e.g. "Difficult to adapt to sanitary facilities" "Poor sleeping quarters" "Lack of outlets in case of fire" "Lack of exercise (sport)" "Idleness"	4.0	33
2.	Statements relating to food e.g. "Lack of certain foods" "Provisioning during winter period" "Inadequate provisions of fresh food"	3.3	14
3.	Communication with Australia e.g. "Limited communications facilities" "Lack of free communication to loved ones at home" "communication with wife via public radio phone"	4.0	19
4.	The presence of women e.g. "Special treatment on grounds of sexuality e.g., toilet, shower" "One female on station"	3.6	7
5.	Changeover period e.g. "Arrival of the first ship with the new expeditioners" "Changeover period"	3.8	5
6.	Illness e.g. "The risk of illness during isolation" "Lack of medical facilities in case of major accident"	3.0	3
7.	Medical Research e.g. "Medical research (blood samples)"	3.5	2
8.	"Pilfering"	3	1
9.	"Not allowed to have pets with you"	5	1

(1)	(2)	(3)	(4)
10.	"Tourist ships"	4	1
11.	"Too many airdrops"[a]	4	1
12.	"Friction between tradesmen and scientists"	2	1
13.	"Behaviour of scientists"	NR	1
14.	"Invasion of privacy"	5	1
15.	"The voyage down and return"	5	1
16.	"Prevalence of 'OIC bashing' syndrome"	4	1
17.	"Lack of respect for traditions in Antarctica by expeditioners"	3	1
	TOTAL	3.8	93

[a]Macquarie Island

Physical Setting

Serial	Additional Source of Pressure	Mean Rating	Frequency
(1)	(2)	(3)	(4)
1.	"Long periods of bad weather"	3.5	2
2.	"Ice conditions, weather, hinder expeditioner return"	3	1
3.	"Perform dangerous jobs during blizzard weather"	4	1
4.	"Unable to reach work site due to weather"	3	1
5.	"Lack of daylight in winter"	2	1
6.	"Lack of plants and vegetable garden"	3	1
7.	"Not knowing the dangers of travelling on sea ice"	NR	1
8.	"The need to be outside in bad weather"	5	1
9.	"Seeing old station run down"	2	1
	TOTAL	3.2	10

Social Setting

Serial (1)	Additional Source of Pressure (2)	Mean Rating (3)	Frequency (4)
1.	General statements relating to the pressure caused by the effect of the behaviour of others e.g. "Having to tolerate anti-social behaviour" "Coping wit' habits and social behaviour o: others" "Donga parties are of a selfish nature - don't allow consideration of others who have to work early" "Coping with alcohol abuse" "Putting up with central figure who is misfit"	3.5	37
2.	"Running out of conversation in group"	3	1
3.	"Division of expedition into splinter groups"	NR	1
4.	"Inclusion of homosexual in group"	3	1
	TOTAL	3.5	40

Self

Serial (1)	Additional Source of Pressure (2)	Mean Rating (3)	Frequency (4)
1.	"Expedition not up to expectations"	3.3	3
2.	"Lack of support from home"	3	1
3.	"Sometime lack of sympathy"	4	1
4.	"Learning of others characteristics and self adjust"	2	1
5.	"Having no-one to communicate with in times of pressure"	3	1
6.	"Coping with own anger, frustration, moods"	4	1
7.	"Understanding the anxieties of others"	4	1
	TOTAL	3.3	9

APPENDIX 11

1983 EXPEDITIONER SAMPLE

ADDITIONAL SOURCES OF PRESSURE IDENTIFIED BY EXPEDITIONERS

The sources of pressure included in this Appendix were provided by the 1983 expeditioners in response to the request to '...add (and rate) any areas that you think should be included as sources of pressure, or stress, for expeditioners'.

Responses are recorded as written by the expeditioners, with examples given for summarized responses. The rating is that used by expeditioners, from 1 (not a source of pressure at all) through to 5 (a source of extreme pressure). Where the wording of statements was the same, a frequency and mean rating is shown.

Task

(Before Departure)

Serial	Additional Source of Pressure	Mean Rating	Frequency
(1)	(2)	(3)	(4)
Statements which considered the Antarctic Division as a source of pressure			
1.	Perceived lack of concern from the Antarctic Division e.g. "Lack of concern from Head Office Supervisors" "Doubt about Antarctic Division staff sincerity toward expeditioner well-being" "Lack of support from Antarctic Division"	2.7	3

(1)	(2)	(3)	(4)
2.	"Lack of sound back up from Antarctic Division"	4	1
3.	"Dissatisfaction with Head Office administration"	4	1
4.	"Doubt about Antarctic Division staff efficiency"	4	1
5.	"Lack of station meetings pre-embarkation"	4	1
	SUB TOTAL	2.7	7
6.	"Considerable term of the expedition"	4	1
7.	"Realization that expedition may not be what I expected"	4	1
8.	"Responsibility to produce the goods in field survey"	5	1
9.	"Lack of free time for other interests"	3	1
	SUB TOTAL	4	4
	TOTAL	3.2	11

(After Arrival)

(1)	(2)	(3)	(4)
<u>Statements which considered the Antarctic Division as a source of pressure</u>			
1.	Perceived lack of concern from the Antarctic Division e.g "Lack of commitment of HQ personnel" "Lack of back up and understanding"	4	2
2.	Supply/Re-supply e.g. "Insufficient minor spaces" "Inadequate stores"	2.7	3

(1)	(2)	(3)	(4)
3.	"Documentation of experiment for new expedition"	3	1
	SUB TOTAL	3.2	6
4.	"Workload"	NR	1
5.	"Ship unloading"	3	1
	SUB TOTAL	3	2
	TOTAL	3.1	8

Role

(Before Departure)

Serial (1)	Additional Source of Pressure (2)	Mean Rating (3)	Frequency (4)
1.	Respondent's task made more difficult by perceived unsuitability, and inefficiency of other expeditioners e.g. "Inability of others to do their jobs" "Having to carry others with their jobs" "Assisting other with their tasks"	3.3	3
2.	"Being excluded from activities because of duty commitments"	2	1
3.	"Favouritism to some by station heirachy"	4	1
	TOTAL	3.2	5

(After Arrival)

NIL

Behaviour Setting

(Before Departure)

Serial (1)	Additional Source of Pressure (2)	Mean Rating (3)	Frequency (4)
1.	Statements relating to food e.g. "Absence of fresh food" "Badly prepared food" "Adjustment to food"	3.3	8
2.	Communciation with Australia e.g. "Limited communications facilities" "Inability to receive personal gifts"	2.8	4
3.	The presence of women e.g. "Women in the party" "Presence of only one woman"	2.5	3
4.	"Not being unable to practise religious beliefs"	2	1
	TOTAL	2.6	16

(After Arrival)

(1)	(2)	(3)	(4)
1.	"Changeover period"	3	1
2.	"Lack of effective handover"	3	1
	TOTAL	3	2

Physical Setting

(Before Departure)

Serial (1)	Additional Source of Pressure (2)	Mean Rating (3)	Frequency (4)
1.	"Blizzards"	3	1
2.	"Cold environmnet"	2	1
3.	"24 hours light/darkness"	3	1
	TOTAL	2.7	3

(After Arrival)

NIL

Social Setting

(Before Departure)

Serial (1)	Additional Source of Pressure (2)	Mean Rating (3)	Frequency (4)
1	"Pressure to conform to smoking/drinking"	3	1
2.	"Living with tobacco smoke environment"	5	1
	TOTAL	4	2

(After Arrival)

NIL

Self

(Before Departure)

Serial (1)	Additional Source of Pressure (2)	Mean Rating (3)	Frequency (4)
1.	"Effect on career of 12/12 away"	3	1
	TOTAL	3	1

(After Arrival)

NIL